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### THE WESTERN ARTS CONVENTION

The Western Arts Association will again hold its convention at Milwaukee, Wis. The dates for this important educational gathering have been set for April 20–23.

In order to give the many members, who attend, an opportunity to plan their visits to Milwaukee's schools, Mr. Roy Radtke, Supervisor of Industrial Arts, presents an article on Industrial-Arts Education in Milwaukee, on page 139 in this issue, and Mr. Robert W. Tarbell, Counselor, Milwaukee Vocational School, an article on Vocational and Adult Education in Milwaukee, on page 141. A tentative convention program may be found on page 174.

Milwaukee, Milwaukee's school system, and the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION Magazine welcome the members of the Western Arts Association to Milwaukee, and hope that their deliberations in the "Cream City" may be fruitful of much good.

### OTHER CONVENTIONS

*March 17–19.* New Jersey Vocational and Arts Association, Asbury Park, N. J. Secretary, J. J. Berilla, 553 Corliss Ave., Phillipsburg, N. J.

*April 6–9.* Eastern Arts Association, Boston, Mass. Secretary, Raymond P. Ensign, 250 East 43rd St., New York City, N. Y.

*April 8–9.* Indiana Industrial Education Association, Indianapolis, Ind. Secretary, H. G. McComb, Purdue University, W. Lafayette, Ind.

*April 9.* Western Pennsylvania Arts Conference, California, Pa. Secretary, S. L. Coover, Teachers College, California, Pa.

*April 15–16.* Illinois Vocational Association, Chicago, Ill., Morrison Hotel. Secretary, H. P. Erwin, Township High School, Sullivan, Ill.

*April 22–23.* Iowa State Drawing Conference, Ames, Iowa.

*April 28–30.* Michigan Industrial Education, Detroit, Mich. Secretary, Thomas P. Garrity, 1314 W. Grand Blvd., Detroit, Mich.

*May 6–7.* Wisconsin Vocational Association, Wausau, Wis. Secretary, Wm. A. Brazier, Vocational School, Milwaukee, Wis.

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*Editorial Contributions* — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.
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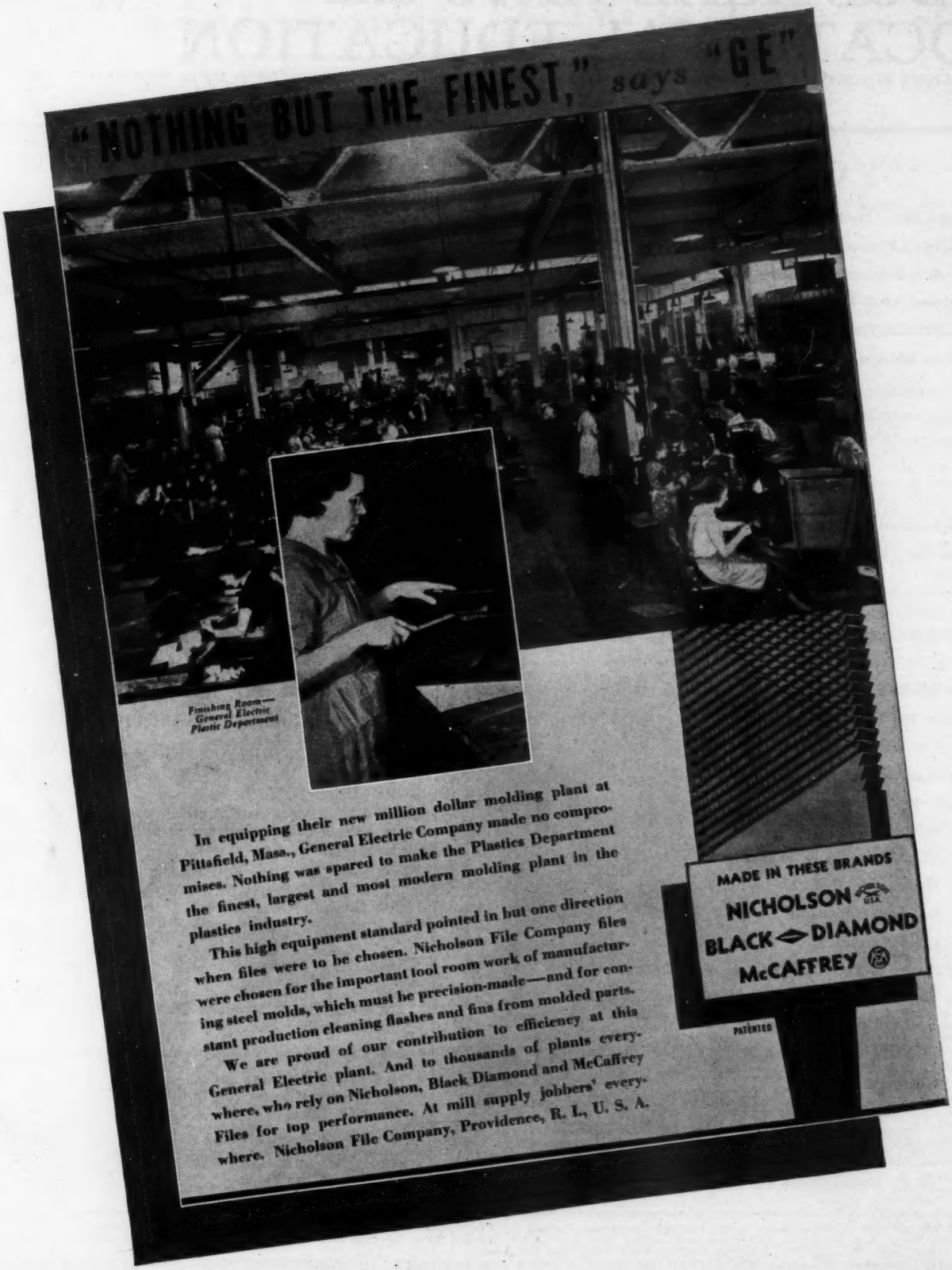
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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

# This Thing Called "Method"—II

**Lawrence F. Ashley**

*Director, Industrial Arts Education, Eastern Illinois State College, Charleston, Illinois*

*Conclusion of the article on the evolution of the project.*

### The Project Method Named and Defined

Some controversy exists as to the earliest use and the precise meaning of the term. There is no mention of the word *project* in an educational sense in dictionaries and encyclopedias published before 1910, though Rousseau[21] did use the term in the sense of plans or ideas as shown by this sentence from *Emile:* "Un celebre auteur de ce siecle, dont les livres sont pleins de grands projets et de petites vues. . . ."

John Dewey is probably most directly responsible for the development of a recognized system to be named by others "The Project Method." In his early books, *The School and Society* and *The Schools of Tomorrow,* are numerous statements which lead to this belief, of which the following are samples:

From the standpoint of the child[22] the great waste in school comes from his inability to utilize the experience he gets outside of the school in any complete and free way within the school itself; while on the other hand he is unable to apply in daily life what he is learning at school. That is the isolation of the school — the isolation from life.

In his chapter "The Psychology of Elementary Education" he says the problem is:[23]

(1) To furnish the child with a personal activity in occupations, expression, conversation, construction, and experimentation, so that his individuality, moral and intellectual, shall not be swamped by a disproportionate amount of experience of others to which books introduce him; and (2) so to conduct this more direct experience as to make the child feel the need of resort to and command of the traditional social tools.

Dewey was in continuous demand as a lecturer at educational meetings, both state and national, and his lectures as well as his writings did much to mature educational thought on both content and method.

Struck[24] quotes Stimson as giving credit to Dr. Snedden of Columbia University for a very early use of the term as follows: "Dr. Snedden remembers using the term 'project' in a committee discussion of the National Education Association in 1908–1909, in connection with manual training proposals; thinks he insensibly carried the word over to discussion of a vocational school unit of work." Snedden used the term again in 1910 in speaking of industrial work in connection with vocational education. He says:[25]

It seems highly probable that boys of fourteen, when beginning their vocational training, can be set to work on *projects* involving wood and woodworking tools in such a way as to produce a marketable product and that, by gradual intensification and specialization of effort, they can be made ready by the age of sixteen for more specific trade instruction in building, cabinetmaking, etc.

Alberty[26] says: "The term appears to have been used originally in agricultural education in 1908 as 'the home project' to make agriculture more interesting and practical." However, ten years later many writers on educational method seem to have made much of the term from 1918 to about 1927. Then it seems to have gradually lost its significance in new terminology. Perhaps Kilpatrick made the best attempt to limit the term to a precise method when in 1918 he wrote a rather masterful discussion of "The Project Method."[27] He stressed the fact that for him the project should represent hearty purposeful activity on the part of the child. He furthermore said that this purposeful activity should be carried on in a social environment. On the other hand, he added: "We contemplate no scheme of subordination of teacher or school to childish whim." He would simply present a task by means of the "project method" in such a way that the learner would accept the job as one desirable for him.

Snedden[28] defined the "project" in 1920:

A project in vocational education is a definite unit of instruction which combines practical or manipulative achievement with definite enhancement of power to apply related technical knowledge. . . . As adapted to school practice, the term might well be confined to those activities which center in the projection of a plan for a concrete end to be achieved chiefly through constructive effort of hand working with brain and in which the achievement of the concrete and valuable product is the controlling purpose sought.

In this sense a project becomes the making of something desired by the maker. The opinions of still other authorities should be understood before one can trace the development of the method in education, and see how so many ramifications can be a part of it. From the standpoint of vocational agriculture, Stimson said:[29]

Thus it will be seen that a complete definition of a farming project as here used involves the three elements of something to be done: (*a*) on a farm, (*b*) under specified conditions and for a specified result, and (*c*) requiring thoroughgoing education.

A slightly different connotation is seen in later definitions. Stockton, a year later than the above, wrote:[30]

Project work or "activity" or "doing" as a method in other subjects has for its aim the assisting of the pupil to learn more about the subject — more of the subject matter of geography, history, etc. But project work, or activity, or doing, used as a subject, has for its aim the learning of more subject matter about activity or doing itself.

Parker[31] had in 1912 explained the project as follows:

The term "project" is commonly used in everyday life to designate practical problems

[21]Rousseau, *op. cit.*

[22]Dewey, John, *The School and Society* (University of Chicago Press), 1899, 164 pages. (See page 67.)

[23]*Ibid.*, p. 105.

[24]Struck, F. T., *Methods and Teaching Problems in Industrial Education* (New York: J. Wiley & Sons), 1929, 214 pages. (See p. 47.)

[25]Snedden, David, Weeks, Ruth Mary, and Cubberley, Ellwood P., *Vocational Education* (Houghton Mifflin Co.), 1910, 370 pages. (See p. 49, Part I.)

[26]Alberty, H. B., *A Study of the Project Method in Education* (Ohio State University Press), 1927, 111 pages. (See p. 29.)

[27]Kilpatrick, William H., *The Project Method* (Teachers College, Columbia University, Bureau of Publications), 1918, see page 12.

[28]Snedden, David, *Vocational Education* (New York: The Macmillan Company), 1920. See pp. 561–562.

as follows:

[29]Stimson, R. W., *Vocational Agricultural Education* (New York: Macmillan Co.), 1919.

[30]Stockton, *op. cit.*

[31]Parker, Samuel C., *A Text-book in the History of Modern Elementary Education* (New York: Ginn & Co.), 1912, 505 pages. (See p. 268.)

which require much consideration, scheming or planning to reach a solution; that is to determine what to do and how to do it. Thus at the present writing a commission from the United States and Canada is actively working upon the project of providing a means for larger ocean vessels to reach the Great Lakes via the St. Lawrence River. This example illustrates the dictionary statements that a project is "something of a practical nature thrown out for the consideration of its being done."

Ferriere[32] quotes from the *Tatschule*, a book published by W. A. Lay in Germany in 1911, to show that he had set forth the prototype of our modern Activity School. This statement from Lay shows familiarity with the term in Europe:

> Modern times require a modern school: *projects* of innumerable reform are being born on all sides.

The activity-school movement was given a tremendous start in the establishing of the J. J. Rousseau Institute at Geneva, Switzerland, in 1912, where projects of all kinds have been carried on from the beginning. The Montessori school soon came to be prominent in Italy. They, too, made use of projects in the teaching of subnormal children. The work of John Dewey was studied abroad as well as at home and new developments were founded largely on his philosophy.

The Elementary School of the University of Missouri, under Professor Merriam had in 1915 already done considerable to develop projects of all kinds on the basis of child interests. Dewey speaks of this work as follows:[33]

> Professor Merriam insists on the fact that this study of the community in which the child lives is made for the educational value of the work itself to the pupil, never as a mere cloak for teaching of the three R's, which must be done only as it contributes directly to the work the children are doing.

Professor Merriam does not use the word *project*, but speaks of each undertaking as an "activity," which has the same connotation as the method definition of project.

Snedden,[35] in 1917, again referred to "project" in connection with vocational education and to designate methods in regard to agricultural education. He named as projects short courses in poultry raising, preserving fodder, bee culture, spraying, etc. Later, in speaking of manual training, he said:[36]

> All work should be on a distinctly "job" or "project" basis; that is, the pupil as a mature worker should set out to accomplish some task which on the basis of mature standards is within the range of his accomplishment.

In the sense of an established piece of work to be done, as Snedden used it above, the term *project* came into very general use in 1918. The Federal Board for Vocational Education issued Bulletin No. 26 in which frequent use of the term was made. For example,[37] "Boys who have been hard pressed by heavy project study and project work during the spring, summer, and fall months, etc." Further use of the term this same year was seen in the paper of Nolan, entitled "Project Methods in Teacher Training in Vocational Agriculture," which appeared in the proceedings and addresses for the National Education Association.

From the nonvocational point of view, Grace E. Storm had an article in the *Elementary School Journal* in which she spoke as follows regarding the use of the project in teaching history:[38]

> As history unfolded itself and the settlement on the Tiber grew to be mistress of the world, the children needed to know more of the buildings and public works which were the result of that far-reaching civilization. So when we had reached the middle of the period of the republic in our study, we destroyed the scene of the Seven Hills on the sand table and began to build the neighborhood of the Forum. The whole space in the pan was devoted to the Capitoline and the Palatine Hills and the construction of some of the monumental buildings and other structures whose ruins still remain as evidence of Rome's greatness and power.

The same year similar work was being carried on in the University of Chicago Elementary School under the direction of Miss Edith Parker. Samuel Chester Parker[39] tells of the course in "Community Life," in which the children studied the family and its relation to the community. The grocery-store project was undertaken, for the needs of the family as supplied by the grocery could furnish many problems. Each child constructed a small store of cardboard and the store fronts were worked out together.

Miss Parker conducted a geography course the next year (1919) around the project: "What are the factors that make the United States a great nation?"[40] She began with general studies on resources, crops, topography, etc. Then specific problems were taken up, such as sugar, tariff, etc., as a social study.

While Miss Parker was conducting this project, Miss Alice M. Krackowizer had published, by J. B. Lippincott of Philadelphia, a book of 321 pages under the title of *Projects in the Primary Grades*. The book is full of things which young children can do that will be of interest to them and at the same time will be educational. Her interpretation of "project" is seen in this statement on page nine of her book: "Projects of all kinds, involving play, social experience, nature experience, constructive activities, are part of the child's play life, long before he enters school."

In 1919, also, the Bureau of Publications of Teachers College, Columbia University, issued a publication by William H. Kilpatrick, entitled *The Project Method*. The next year (1920), there was an article in Volume VI of *Studies in Education* (Chicago) entitled "The Individual Project Method in the Francis Parker School." By 1920–21 the whole educational structure was permeated by the "project method." More books and pamphlets were written on the subject. Most educational meetings had one or more speakers on the subject. Schools favorably situated with regard to finances and with respect to tolerance on the part of patrons and the board of education changed their whole educational setups and were looked upon as national and even international experiments. Somewhat different techniques were set up in different institutions, and original terminology was devised to distinguish one plan from another.

The idea of problem solving as an important factor in the project method is set forth by Stevenson in his statement that "A project is a problematical act carried to completion in a natural setting."[41] Later writers carry out this thought to the extent that the original term is coming to be forgotten and in its place one finds the terms "problem solving," "problem-solving situations," and "units of work." These will be mentioned in more detail later.

Thus one finds at least two distinct notions of the project method: (*a*) "used as a subject to enrich and vitalize the whole curriculum,"[42] and (*b*) as a method of acquiring knowledge. Wide general use of the former idea was made by early teachers of manual training and agriculture when they referred to the thing done or to be done, as the project. Wide use of the latter notion is being made now in the progressive schools or activity schools, but under different terminology. It then becomes necessary in a study of the evolution of the project to consider both ideas. In each there is the idea of "doing" or "constructing."

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[32] Ferriere, *op. cit.*, p. 136.

[33] Dewey, John, *The Schools of Tomorrow* (New York: E. P. Dutton Co.), 1915, 316 pages. (See p. 45.)

[35] Snedden, David, *Problems of Secondary Education* (New York: Houghton Mifflin Co.), 1917, 330 pages. (See p. 87.)

[36] *Ibid.*, p. 105.

[37] Prosser, C. A., et al., *Agricultural Education* (Washington, D. C.: Federal Board for Vocational Education), 1918, 31 pages. (See p. 28.)

[38] Vol. XVI, 3 (November, 1915), pp. 137, 138.

[39] Parker, Samuel Chester, *Types of Elementary Teaching and Learning* (New York: Ginn & Co.), 1923, 585 pages. (See p. 279.)

[40] *Ibid.*, p. 279.

[41] Stevenson, John A., *The Project Method of Teaching* (New York: Macmillan Co.), 1921, 305 pages. (See p. 43.)

[42] Snedden, *op. cit.*, pp. 561, 562.

## Evolution in Terminology and Techniques

By the end of the first quarter of the twentieth century the Activity School was well represented in Europe, North America, and South America, with local, national, and international associations and representative schools. Some of them were known as "progressive schools," some as "activity schools," some preferred no special name but were classed as "progressive" or "experimental" schools. The University School of the Ohio State University is one of the latter, but it prefers to be known simply as "a good school." Then there are several with special names such as The Gary School, The Winnetka School (the word *plan* is used in connection with the name of the town), and the Dalton Massachusetts (plan of Helen Parkhurst). Modifications of these plans can be found in most cities. All seem to be motivated by the ideas set forth in the following statement of Kilpatrick's:[43] "We understand the term 'project' to refer to any *unit of purposeful experience*, any instance of purposeful activity, where the dominating purpose as an inner urge (1) fixes the action, (2) guides its processes, and (3) furnishes its drive, its inner motivation." Here attention is directed to the use of the term "unit of purposeful experience" (1921) which is one of the early cues to present terminology. It is the fashion in activity schools to refer to basic principles, in elementary education at least, as "units of work."

The term "centers of interest" was used by Stockton[44] in 1920, in speaking of the use of the study of flax as a center-of-interest subject in the sense of Kilpatrick's definition as stated above. He said: "Flax also has everywhere a very close connection in time and in space (history and geography) with the human race itself. . . ."

The word *progressive* was used by Parker[45] in 1923 in describing the frontispiece of his book as follows:

The dramatic scene pictured in the frontispiece illustrates project teaching, a kind of activity that has recently become popular in progressive schools. In such teaching the pupils plan, devise, and contrive some practical activity — something to be done. Hence a pupil project is some practical pupil activity planned by the pupils.

During the past few years there has been an ever-increasing number of terms to designate the "project." To quote Stevens[46] in 1931:

The term "Units of Work" is variously expressed by others. Some of the formulations are: centers of interest; projects; life situations; activity units; pupil enterprises; unit experiences; the social group project; a central activity; a central theme; a unit organization; and organization around a nucleus of child activity.

A publication issued by the United States Office of Education, entitled *Teachers Guide to Child Development*, which is a digest of the book by the California School Commission under this title, uses also the terms "activities curriculum," and "developmental activities." In spite of the growing list of terms, there does not seem to be very much confusion as to what is meant. One can see in most of the offerings in the newer schools Kilpatrick's idea of a "project." Due to the work of the California School Commission and the issuance of the government bulletin, one may find the word *activities* somewhat more used, though the term "units of work" will be found in almost equal prominence.

## Developing a Unit of Work

If one were to visit the University School of the Ohio State University, where some outstanding work is being done in the project method, one will seldom hear the term used. Instead one will hear much about "units of work." It is the plan that all schoolwork grow out of (1) a felt need, and proceed with (2) a plan for its solution, (3) collection of data, (4) experimentation, selecting and discarding data, (5) weighing the results. The most important first work of the teacher is the creation of an atmosphere in which the children feel free to share in making the plans for the classwork, to do many things in which they are interested, and be responsible for the welfare and success of the group. Usually from two to three weeks are spent by all of the students under a given teacher in investigations of any of the thousand and one things which are likely to appear daily as interests of individuals or of the group. This may be said to be an orientation time or experimentation time during which the child learns about things and isolates questions which are of great interest to him. These investigations may require the use of the library, visits outside the school, conversations with others, and personal experimentation on the part of the pupil.[47]

There are two major purposes in the investigations carried on preliminary to the development of the study project or unit of work: (1) to have the child become used to the research method of study, and (2) to select a unit of work or activity which will measure up to the criteria which the pupils, the teachers, and the head of the school have developed. Incidentally the children become acquainted with one another and acquire various bits of knowledge and experience. Following is the list of criteria developed at the University School. The California School Commission has a similar list.[48]

### Criteria for Selecting a Unit of Study

1. Is the study appropriate for the maturity level of the group being considered?

*a*) Is it sufficiently related to the children's lives and interests?

*b*) Is it within the learner's ability so that it prevents discouragement?

*c*) Have the children a suitable background for the experience?

2. Is it leading on or extending the horizon of the children's experience?

3. Does it have "leads" into other areas to be explored and gripping ideas for thought and discussion?

4. Will it provide opportunities for encouraging the scientific attitude and method in the children, making them problem finders and problem solvers?

5. Does it provide for individual initiative in both work and play?

6. Does it offer possibilities for both group and individual pursuits, thus providing for individual difference?

7. Will it offer opportunities for many types of undertakings and experiences with a large variety of expressive materials?

8. Will it provide materials for research?

*a*) Pictures.

*b*) Books.

*c*) First-hand experiences.

*d*) Various research facilities.

9. Will it provide for growth in skill through repeated problem situations rather than drill on isolated aspects of experience?

10. Will it be a social influence as well as an influence toward wholesome personal integration?

11. Will it provide opportunities for cooperative living, sharing, planning, evaluating, working, and playing together?

12. Is it probable that this unit, through child participation, will bring to the fore fundamental social issues of significance to children?

13. Will it provide a carryover into the child's out-of-school life?

14. Will it provide situations which call for a reorganization of experience and which will tend to eliminate compartmentalization?

15. Will it be interesting to the children and to the teacher?

16. Will the children really enjoy it?

Having decided upon a unit of work which most nearly measures up to these criteria, the class is divided into committees according to their interests in connection with the project. The committees set about their researches to uncover all of the information necessary for a complete understanding of the unit chosen. For example, a seventh-

[43] Kilpatrick, W. H., *Teachers College Record*, Vol. 22, Sept., 1921, p. 283.
[44] Stockton, *op. cit.*
[45] Parker, *op. cit.*
[46] Stevens, Marion P., *The Activities Curriculum in the Primary Grades* (New York: The Macmillan Co.), 1931, 440 pages. (See p. 299.)
[47] *Criteria Developed by the Teacher, Pupils, and the Director*, University School, Ohio State University.
[48] The California School Commission. *A Teacher's Guide to Child Development* (Sacramento), 1930, 658 pages. (See p. 25.)

grade group selected the project "Trade Routes and Commerce." A second-grade group selected "How Columbus Takes Care of Its People." The latter study involved a knowledge of civic organizations, and required visits to public buildings, such as the courthouse, jail, fire department, health department, etc. The project was the whole course of study for the children of that group for such a period of time as it proved profitable from the standpoint of the child's interests and growth. Projects may last a day or a year on this basis. All of the written work, involving grammar and spelling, the number work, history, geography, etc., grows out of the project selected to meet needs of the child in connection with the undertaking of the class. The large major project may be said to be composed of numerous smaller projects in art, industrial arts, and the other subjects necessary to the development of it.

### Summary

The "Project Method" in education came to be named in the twentieth century because of the development of interest in method beginning about the middle of the eighteenth century. Like the object method, with which it is closely associated, it was the result of bringing into the processes of school learning a method which had proved effective from the beginning of man's endeavors. The process to become a part of educational thought had to go through a long period of evolution and experiment. The word *project* was used about the same time to name a task, a plan, or an undertaking.

While the idea of the use of projects can be seen in the work of the early Egyptians and Greeks, the first real motivating force back of its use in modern theory was the work of Pestalozzi in the eighteenth century, though the project was not isolated and defined as a method until the twentieth century. Immediately following the world war it came to light in every civilized country as a panacea for educational ills. It has since been considerably refined and is undergoing much change in terminology. Where it started as an imposed job as far as the pupil was concerned, it has developed into a self-initiated activity for him, supposedly under the guidance of a very skillful teacher. In the last analysis, the project as defined by Kilpatrick[49] may be seen to underlie the general method as carried out in newer schools; namely, "A unit of purposeful experience, any instance of purposeful activity where the dominating purpose as an inner urge (1) fixes the action, (2) guides the processes, (3) furnishes its drive, its inner motivation." This is exemplified in the "Units of Work" developments in various parts of the world, in which the name *project* has come to be a course of study made up of smaller units perhaps also designated as projects. It is this idea of purposeful experience which Kilpatrick has made so potent that furnishes the clue to industrial-arts procedures — as well as for other subjects.

[49]Kilpatrick, *op. cit.*

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*A useful alphabet for the drafting room by W. Ben Hunt, Hales Corners, Wis.*

# Industrial-Arts Laboratory Planning—II


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*Acoustics, heating and ventilating, and dust and smoke are the topics treated in this, the second of a series of articles on laboratory planning.*

### Acoustics

Industrial-arts laboratories are noted for their noise. Because we have inherited our physical setup very largely from industry, we have not given much consideration to the problem of acoustics. Our machine age has slipped up on us so gradually that the noise problem has likewise slowly become increasingly worse until suddenly human beings got to the point where physical mechanisms simply rebelled.

Many cities, notably New York City, have made studies of the noise problem, and from these, techniques have been devised which will enable educators to make progress in eliminating and silencing noises in school buildings.

Many industrial-arts teachers have had the experience of having their work put off in some isolated corner of a building simply because of the "racket" which was produced. Some industrial-arts teachers have hesitated to add metalwork to the industrial-arts offering, simply because of the noise which is produced on anvils and on other metalworking machines.

Instruments for the measurement of noise are now commonly available, and although they are somewhat expensive, yet there is some probability that they will soon be used to quite an extent in order to locate those machines and devices which are sources of the most noise. These noisy devices and mechanisms will either be silenced, or some other work will be chosen which is not so detrimental to the human nervous system.

Until the past few years, there has been little or no consideration given to the site on which a school building should be placed as far as noise is concerned. There is much less noise in residential centers than in industrial centers and in locations where there is much adjacent transportation.

Fortunately, or unfortunately, there are other activities of the school which produce some noise, and if at all possible, the industrial-arts department should be located adjacent to these. Drawing, in our field, of course, is probably the most quiet. Unless this is carried on as a part of general-shop work, it can be given in a room which is relatively quiet.

In our mad rush to secure efficiency, industrial-arts teachers have seldom thought of the noise intensities in relation to room size. From the standpoint of noise, it probably would be well to have at least 60 sq. ft. of floor space per pupil in practically all industrial-arts subjects, except drawing. Of course, for some extremely noisy subject, the room should be larger if one expects to keep down noise intensity.

The walls, ceilings, and floors have likewise seldom been thought of from the acoustical angle. Thus hollow tile, glazed brick, and concrete have commonly been used. These are all "good" reflectors of noise. Terrazzo is especially abominable. We will probably have to put up with some fairly hard material for walls up to a height of about 5 ft. Above this and for the ceilings, acoustical plaster may well be used. For the ceilings, where one wishes to use the very best kind of sound-absorbent material, something like celotex, or other acoustical board, may be secured from dealers and manufacturers who specialize in this kind of material. It is needless to point out that when this kind of material is to be painted, the paint should be sprayed rather than applied with a brush. If a great deal of paint is applied, the acoustical plasters and boards loose their sound-absorption values. Hard, glazed, plastered walls are especially bad in the reflection of noises. Rough walls are less noisy, but they are also much more dirty. No doubt our cleansing and ventilating systems in schools will be much improved within the next few years. This will permit us to then use the rough walls.

In the planning of many school buildings, little thought has been given to the amount of noise that is produced by banging doors and rattling windows. Whistling and rattling windows may be eliminated by using weather strips. In addition, the weather stripping will more than pay for itself by the heat which is saved in winter. All doors, of course, should be equipped with automatic closers, and they should open outward and permit exit toward the nearest entrance. Fire-resistant wire-mesh glass should be used in all laboratory exits.

Shop floors should be insulated from the walls and foundation which support them. This will do much to prevent transmission of machinery noises to distant parts of the building by means of vibration. In case a wooden floor is to be used in the industrial-arts laboratory and it is put on strips which are imbedded in the concrete, it would be well to use insulating material under the wooden floor and between the strips. This material will help to eliminate certain noises.

Because industrial-arts laboratories have usually been placed in basements, the students have suffered much noise from other sources, for instance, that arising from ventilating pipes, sewer traps, steam pipes, and water pipes. The steam pipes especially often "pound" because of water which has backed up in return pipes. From an esthetic, as well as from an acoustical standpoint, all industrial-arts teachers should rebel at having their ceilings decorated with unsightly and noise-producing pipes.

When equipment is considered from the acoustical angle, it is found that much research is needed before one can progress very far in reducing machinery noises. It is known, of course, that it is a good thing to insulate noisy, vibratory machinery from its floor or wall supports. Hall (1),[1] for instance, has this to say:

> Proper installation of a motor or a machine is one that prevents the transmission of any of the noise that may be inherent in the machine and also provides against its amplification. Transmitted noises may be of two natures — air-borne and vibratory.

In case there are several similar machines which are especially obnoxious from the noise standpoint, they should be isolated in a separate room, providing, of course, other factors so permit. A good illustration of this is a ceramic kiln. It is also true of exhaust fans and motors. One of the axioms in the field of acoustics is that just as far as possible all existing noises should be absorbed at the point of origin. Quoting again from Hall (1):

> Steel, concrete and even wood are better transmitters of sound than air. If therefore the vibrations of pieces of machinery are not properly isolated from the steel beams or concrete foundations upon which they are mounted, the vibrations transmitted by them will sooner or later reach the walls and ceiling of the room in which they are operated, or they may be transmitted to other rooms. Under extremely poor conditions of isolation

[1]Numbers in parentheses refer to bibliography at end of article.

they may be carried through a large portion of the building. The noise thus transmitted may be amplified by a large surface and a noise produced that will be more intense than it was at the original source. If, in addition, some wall or ceiling has a natural frequency corresponding to that of the transmitted vibration, a resonant condition is set up and the noise may be increased several-fold. As the noise intensity increases in proportion to the square of the amplitude, it is readily seen that vibrations which at their point of origin may not have been objectionable may be thus amplified to the extent of becoming very annoying.

Many industrial-arts teachers have made the mistake of purchasing the largest machinery available. In more than one school woodworking shop, for instance, there are band saws with 4-ft. wheels. It is a most unusual piece of work which requires a saw of this size, and one can be certain that it produces a great deal more noise than do band saws of the 24- to 30-in. size. The machines chosen for the school shop should be no larger than absolutely required. This is true from an economical as well as from an acoustical angle.

Just as far as possible, the placing of motors, shafts, and other noise-creating machinery on walls, ceilings, or other sound-amplifying areas should be avoided. If this rule cannot be observed, they should be insulated. A small electric grinder placed on an angle-iron frame which was anchored to a concrete supporting post in a certain industrial-arts laboratory, for instance, could be heard over the entire building, because the rule just mentioned was not observed.

Industrial-arts teachers have been tremendously slow in quieting drives of all kinds. A flat-belt drive is much more noisy than a V-belt drive. The direct-drive machinery, of course, is much quieter than that driven from line shafts. Hall (1) has this to say:

> This type of drive, consisting of a number of V-shaped belts running in grooved sheaves, has almost entirely replaced the former practice of employing flat belts. In addition to its admirable feature as a sound isolator the silent belt drive operates on much shorter center distances than the flat belt drive, thus effecting a saving in floor space, and it also obviates the flapping of the belt, which in itself often proved a source of considerable annoyance as its sound was readily transmitted through the ducts to the remote parts of the building.

It hardly seems necessary to suggest to industrial-arts teachers that machinery which is well oiled will be quieter than that which is allowed to run dry. With jointers, table saws, planers, and shapers, it is highly important that the cutting edges be kept sharp. If this is not done, much pounding will result. Also, it is important that bearings, especially if they are of the Babbitt type, be kept in adjustment. For parts that revolve at high rates of speed, such as jointer heads and planer heads, it is important that they be well balanced. Many industrial-arts teachers sharpen their own jointer and planer knives, and neglect to ascertain whether all knives weigh the same.

We may even see the time when direct-driven machinery, especially of the high-speed type, is obsolete. This is because there is a possibility of using a slow-speed motor and stepping the speed of the machine tool up by means of V-belt drive. Incidentally, this will enable us to be much more selective in the cutting speed of cutting tools.

From an esthetic angle, industrial-arts laboratories have seldom appeared as well as they might. It may be that the time will come when draperies and other materials are used to adorn the walls of the school shop if for no other reason than to help cut down noise.

## Heating and Ventilating

The writer feels incompetent to give much advice in regard to the problem of heating and ventilating. As a consumer of these products, he is rather certain that there will be something better for the future. At the present time, pupils are frequently placed in drafts near cold windows, and the air in the schoolrooms is very impure, dusty, and actually dangerous to human health. Frequently, too often the humidity in these rooms is extremely low, thus making the average person much more liable to colds, and possibly other diseases as well. In many cases, the temperature varies from cold to hot, and even the better janitors aren't always able to control the heating and ventilating mechanism.

There is every reason to expect that the day is not far off when schools will be in operation at least eleven months of the year. This makes it highly desirable that some sort of cooling system be available for the hot summer months. The following is taken from an editorial (2) on "Heating and Air Conditioning":

> All this means that the architect may approach the question of air conditioning for schools with the assurance that he is not being asked to experiment. All he has to do is to accept aid from thoroughly trained and experienced technicians. From these he should ask for a system that:
>
> 1. Establishes temperatures and relative humidity within suitably narrow toleration limits within the occupied zone of each space conditioned.
>
> 2. Establishes simultaneously with the above, and also within predetermined limits, the rate of air motion and its direction. Both of these should be controlled without draft or stagnation at any point in the occupied zones.
>
> 3. Establishes a requisite degree of air purity on a specified maximum dust count basis.
>
> 4. Provides replenishment with a predetermined minimum quantity of outdoor air to sustain a wholesome atmosphere.
>
> 5. Purges haze from smoking and other sources.
>
> 6. Prevents the detectable concentration of odor vapor.
>
> 7. Accomplishes items 1 and 2 uniformly in the same space and in adjacent spaces regardless of difference in local conditions in different spaces.
>
> 8. Scientifically controls sounds generated by the operations of any of the equipment.
>
> 9. Provides means for a sliding scale relation between indoor and outdoor conditions.
>
> 10. Provides instruments and means of foolproof operation, cost control and recording and supervision of results produced.
>
> 11. Provides adequate accessibility for proper maintenance and quick repairs.
>
> 12. Properly co-ordinates with the general architectural scheme.
>
> 13. Properly co-ordinates with the other mechanical services to assure adequate operation with a minimum staff.
>
> 14. Properly co-ordinates with the other mechanical services in an economic sense, so that the electrical and plumbing costs rightly chargeable are included in the budget for air conditioning.
>
> 15. Establishes total ownership cost at a minimum, by location, selection, and arrangement, pumping methods, etc., without sacrifice of any item herein.
>
> 16. Maintains a known initial and operating cost in economic balance with the building cost.

The editor then points out that the advantages of a heating and air-conditioning system which meets the above specifications will have several advantages in addition to guaranteeing health to teacher and pupils. He continues:

> Thus where there is a complete air-conditioning system:
>
> 1. Annual redecorating costs are considerably reduced.
>
> 2. Routine cleaning costs are considerably less.
>
> 3. Sudden expansion and contraction due to fluctuating differentials between indoor and outdoor surface temperatures are eliminated.
>
> 4. The cracking of plaster is virtually abolished.
>
> 5. All hygroscopic materials, such as leather, paper, woodwork, glued joints, and certain types of finishes are preserved for many years beyond their normal life under ordinary conditions.
>
> 6. Office material and desks stay fresher and cleaner throughout the day.
>
> 7. Heating costs are materially reduced in several ways:

*a*) By the maintenance of a lower average temperature.

*b*) By reduction of cold air leakage inward and warm air leakage outward through windows.

*c*) By reduction or elimination of the loss of radiant heat to cold window surfaces.

8. The possibility of keeping windows tightly locked tends to prevent thieving.

9. Operating costs ordinarily charged to ventilation are entirely absorbed.

10. In many cases the unit cost of steam and electricity may be reduced. The changed load factor permits the purchase of additional steam or electricity in the lower rate brackets. In one recorded installation refrigeration was thus obtained for virtually nothing.

11. Sealed windows tend to prevent the possible spread of fire. This may often result in lower insurance rates.

12. In many cases the economic return from the school plant could be materially increased by cooling air so that the plant might function at maximum efficiency throughout the entire year. This would particularly apply to auditoriums.

### Dust and Smoke

Very little research has been devoted to the topic of dust elimination in the industrial-arts laboratory. If a dust count were made of the air in the average school wood-finishing room and the air in the school shop, very little difference would likely be found. Research alone will give the real answer to questions of this kind.

Then, too, little thought has been given to the placement of machinery and benches so far as easy cleaning is concerned. Because, in many cases, janitors have had to do the cleaning, shop teachers have not recognized this as a problem about which they need to worry. The time will come when pedestals and under parts of benches will be so designed that they may be much more easily cleaned than at present. In the wood-turning lathes, for instance, one can brush the top of the lathe off and the dust goes down to a shelf. Then this is brushed off, sending the dust to a lower shelf. This is just an illustration to show that many of the machines used are not designed so as to make cleaning easy or efficient.

Very few states have laws requiring exhaust systems for woodworking and other machines that produce much dust. These exhaust systems are extremely desirable, but only in few instances are they installed in any sort of ideal manner. The pipes in most cases are run through the room so as to be not only unsightly, but also noisy. Dust exhaust systems have been installed under the floors in some shops and they have been successful. It would be well to adopt this system more generally.

Most metal-melting furnaces produce quite a bit of smoke. Especially is this true if scrap metal is used. The lifting of the molten metal is dangerous if the furnaces are placed above the floor level. When the furnaces are placed in a pit in the floor, they are much quieter, the molten metal can be taken out with less danger, and it is also easier to improvise a hood which will take off the obnoxious gases.

Consideration should be given to the flues which take off waste gases — especially is this true with the ceramic kiln. The flue should be lined with fire brick so as to obviate the danger of setting fire to the building.

The system of cleaning industrial-arts laboratories will doubtlessly be revised in the very near future. As it is now, a janitor simply sweeps the dust around from one place to another, and a large part of it goes into the air and finally arrives back where it came from. There is every reason to think that a vacuum cleaning system will be available in the newer schools of the future.

Concrete floors are not at all easy to clean. If they had been put down properly, they would be reasonably easy to clean, but in most cases the method of finishing the concrete has brought much of the fine cement to the top and this dusts off in particles. A concrete floor should be finished by letting the concrete partially set so that the free water has disappeared. A wooden float should be used first. The concrete should be allowed to set further, and then it should be given a final finish with a metal trowel. In this way, a concrete floor is obtained which is smooth and easily cleanable.

Concrete, however, for laboratory floors is objectionable from a health standpoint. It is the author's best guess that an industrial-arts teacher would be able to render at least two more years of active service if he did not have to work on a concrete floor his whole life. Wooden floors and composition floors are much to be preferred. It is a rather safe guess that the last word has not yet been said when it comes to material for floors in industrial-arts shops, both from the health angle and from the cleaning angle. The corners where baseboards join the floor have often been square and have not been easy to clean. This could and ought to be changed in the future.

Cabinets and cases of all sorts should, whenever possible, be built in the wall and arranged flush so that there are no empty pockets and corners to collect dirt and rubbish. This would eliminate the objectionable catch-alls, tops of cupboards and cases. Just as far as possible, all window ledges and other natural areas which collect dust should be eliminated.

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2. Editorial, "Heating and Air Conditioning," *Architectural Forum*, 62:91–92, January, 1935. Gives an excellent set of requirements which a heating and air-conditioning system for schools must meet if it is to be ideal. Lists several advantages of such a system. Gives several implications for the school architect.

(To be continued)

# Industrial-Arts Education in Milwaukee

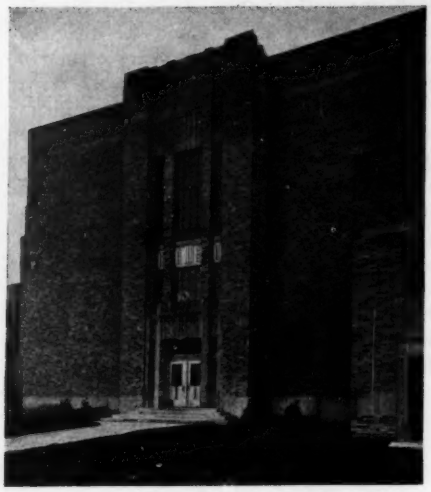
## Roy Radtke

*Supervisor of Industrial Arts, Milwaukee, Wisconsin*

*Schools that invite inspection when the Western Arts Association meets in Milwaukee in April.*

The Western Arts Association Convention will be held in Milwaukee from April 20th through 23rd. It is ten years or more since this group has met in Milwaukee, and we extend all members of this association greetings, and welcome them back to this city of hospitality. To those who are acquainted with, or who have previously visited Milwaukee, no word of encouragement need be spoken, because they will make every effort to return. But to the newcomer, we extend an invitation to attend the convention and to visit the city.

Milwaukee is a friendly city located on Lake Michigan, has a population of 600,000, and carries on an extensive commerce through its lake port, by steam and electric rail, and by airplane. However,



*Rufus King High School*

besides being a commercial trading center, it is also a large manufacturing center, and its products go to all parts of the world. During the past decade or so, it has gained a national reputation as a well-governed city, and its financial standing has ranked with the best cities of the country. But besides being well-governed and managed, it has stood foremost among the larger cities of the country in health, in safety, in police efficiency, and school construction. The natural characteristics of its people have gained for Milwaukee a reputation as a conservative, thrifty, home-owning, and home-loving city. These characteristics have also given it stability and a due consideration for good schools.

If one were to ask an outsider, "What is the principal industry of Milwaukee?," his answer most likely would be, "Beer." However, that commodity plays only a small part in the total products of the city. The industries of this city are so diversified, that Milwaukee could almost be considered as being self-sufficient, because it manufactures everything from the largest steel and gray iron castings made in the United States, down to the smallest household utensil. Its principal products, however, are in the metal trades and heavy industries such as cranes, hoists, turbines, Diesel engines, agricultural implements, auto accessories, herringbone gears, refrigeration plants, mining equipment, and the like. Besides these, packed meats, knit goods, tanneries, leather goods, boots and shoes, and millwork, are also among the products manufactured here. However, as may be seen from the foregoing, the iron and steel industries predominate.

It is only natural, then, that in a community of this kind, skilled mechanics should be constantly in demand. But, as in many other communities, industry during the past ten years or more has failed to train a sufficient number of apprentices to replace those journeymen who have retired, have died, or are too old to return to their former jobs. This was shown by the recent business recovery, where the demand for skilled mechanics was greater than the supply. Fortunately, during this same period, the schools of Milwaukee did not curtail their industrial-arts or trade-training program. As a matter of fact, they increased it. Thus, the graduates of our technical schools were able to fill part of the gap caused by this shortage.

Before presenting our industrial-arts or trade-training program, the following information will be helpful in understanding the local situations:

1. Wisconsin has a compulsory school-attendance law, which compels every boy and girl to attend school until he or she is eighteen years of age.

2. Wisconsin has an apprenticeship system set up by the state and administered by the Industrial Commission. The supervisors, working under the direction of this commission, have been very helpful in co-operating with industry, the home, the school, and in regulating the hours of labor, school attendance, and the fulfillment of contract requirements by all parties concerned.

3. Wisconsin has a dual system of education. Practically all industrial-arts work throughout the state, and this includes Milwaukee, is under the supervision of the regular public school system, while vocational education, as such, is conducted

*Project-storage cabinets, Rufus King High School*

*Electrical department, Rufus King High School*

under the supervision of separate regulating boards. In some of the smaller communities, there has been a tendency toward unification in order to avoid duplication of equipment and teachers. But, in general, these two systems continue to function as separate entities.

Long before these laws were adopted, the Milwaukee school board established schools which would meet the aforementioned requirements. First and foremost, and perhaps two of the outstanding schools of their kind in the United States, are our trade and technical high schools, one for girls and one for boys. Since neither time nor space will permit a complete description of these schools and their curriculums, this paper will be limited to a brief discussion of only the boys' school.

It was established in 1906 as a private institution to prepare young men for the metal trades. In 1907, it was made a part of the regular public school system. From 1907 until 1915, it was operated as a trade school, but its growth was very slow. However, in 1915, due to a change in the policy, a technical-high-school division granting a regular high-school diploma was added, and immediately the school enrollment began to increase. In 1915, the attendance was approximately 200; at the present time it is well over 2,800. The name of the school was also changed from "The Milwaukee School of Trades" to "The Boys' Trade and Technical High School." These changes in name and policy have completely reversed the pupils' status situation, and today, instead of waiting for pupils to come to the institution, the school has a waiting list of pupils anxious to enroll.

The policy of the school is threefold:

1. Any boy, sixteen years of age, may enter and learn one of the fifteen or more different trades offered.

2. Any graduate of the eighth grade, and capable of doing regular high-school work, may upon graduation get a high-school diploma, which will permit him to enter any university accredited to the North Central Association.

3. Any boy may get a high-school diploma and a trade certificate by doing additional work. Graduates of this school, while not considered full-fledged journeymen mechanics, are recognized by Milwaukee manufacturers, and are given advance rating and pay while working to complete the requirements of their trade.

In addition to the two senior trade and technical high schools, there are four junior trade schools, two for boys and two for girls. These are intended as feeders for the senior schools, and, in the case of the boys' schools, have a more intensive and extensive program in industrial arts than do the regular junior high schools. For those pupils who do not wish to enter a trade but wish to supplement their academic knowledge with practical training, a system of industrial-arts education has been established as a part of the curriculum of all grammar grades, junior highs, junior-senior and senior high schools.

Industrial-arts education begins in the fifth grade of the elementary school and continues through the twelfth grade of the senior high school. This program is being modified by dropping the work in the fifth and sixth grades, and extending the time in the seventh and eighth grades from 90 minutes per week to 225 minutes per week. With the adoption of the new time schedule and new courses of study, all seventh and eighth grades in grammar grade schools will eventually be put on a junior-high-school basis.

The exploratory program on the unit basis for these schools is as follows:

7–B General woodwork
7–A General metal
8–B General electricity
8–A Patternmaking, molding, and cement

Mechanical or related drawing is carried on as a part of each semester's work.

The outline for the senior high schools is as follows:

9–B Woodwork
9–A Industrial mechanics
10–B and 10–A Advanced metalwork
11–B and 11–A Cabinetmaking
12–B Patternmaking and molding
12–A Advanced work in any previous shop
9–B and 9–A Mechanical drawing
10–B and 10–A Mechanical drawing
11–B and 11–A Mechanical or architectural drawing
12–B and 12–A Mechanical or architectural drawing

Milwaukee has some very fine junior and senior high schools. Many of these are new buildings, and those wishing to observe industrial-arts work first hand, are invited to do so.

# Vocational and Adult Education in Milwaukee

## Robert W. Tarbell

*Milwaukee Vocational School, Milwaukee, Wisconsin*

*Another of Milwaukee's renowned educational institutions which invites inspection by the members of the Western Arts Association when they convene in Milwaukee.*

Milwaukee is the home of a unique institution. Here in the middle west, in the city that loves its music and parks, its lakeside and its climate, in the metropolis of homes and industries and peace-loving people stands the Milwaukee Vocational School. This is the university for the working man or woman, boy or girl. It is a monument to the good sense and persistence of its founders, the statesmen who created the law and the people who have fostered its growth.

*Foundry, Milwaukee Vocational School*

### Legal Status

The Milwaukee Vocational School is the product of a state law passed in 1911. There is a State Board of Vocational Education, and there are local boards in more than forty cities. A separate, mandatory tax makes it possible to build and operate these institutions. In a fairly specific way the legislators said that young boys and girls should have an opportunity to leave their juvenile occupations and come back to school part time. Indentured apprentices receive related trade instruction, and adults may attend school on a voluntary basis. Looking back a quarter of a century we begin to appreciate the clarity of vision exhibited by those who wrote the law.

### Size of Plant

It is no ordinary little red schoolhouse that has been erected near the city Auditorium. Six stories high, with two basements, it houses a whole community. There are more than two hundred classrooms, the floor space covers some eleven acres, and instruction is given in about one hundred lines of work. The belief is strong that people learn by doing. If men and women are to succeed in the workaday world, they should experience the same activities in school. The facilities for instruction are suited to the capacities and needs of students. The institution finds a place in its curriculum for new courses as

*Machine shop, Milwaukee Vocational School*

*Electrical machinery, Milwaukee Vocational School*

soon as the demand is sufficient. Along with a plant of this size there is a large student body. A cross section of the weekly attendance shows well over 20,000 people in attendance. The faculty is likewise a considerable group. There are over 200 members on the day staff and then there is an evening faculty large enough to teach nearly 400 classes.

### Many Schools in One

This school is a composite of several departments. A commercial division with complete preparation in secretarial work or in accounting provides an opportunity for all students who are interested. Many young women expect to become homemakers and are especially interested in the various phases of that occupation, such as a study of foods, clothing, home nursing, personal hygiene, music appreciation, laundering, and the other activities that make the home attractive. The industrial division covers many occupations. If it is welding that is desired, the young man or older man can find his level, learn the business, and be ready for a job. Likewise, instruction is available in many other industrial and technical lines. Age is no barrier in the upper years. The snows of seventy winters rest easily on the brows of men and women who are back in school and making progress. It has been said that apprenticeship passed out with the advent of the industrial revolution but there is a revival. At this school, there is a large and flourishing department, with many hundreds of apprentices in attendance. They are working at the trade under a bona fide indenture and attend school one day each week. These students are mostly high-school graduates, and some have attended college. Another group is attending high-school classes. This is the only public high school in Milwaukee for adults. The work is fully accredited by the North Central Association. In preparation for this school a group is completing the requirements for the eighth-grade certificate. It is no unusual event to have men and women of fifty years receiving the eighth-grade certificate or the high-school diploma. And then there are advanced classes known as the certificate courses. Many earnest, capable young men and women cannot hope to attend college. They do wish to go on further in school. For this group the Milwaukee Vocational School has a two-year, full-time program beyond the high school. It is half vocational and half academic and related. The vocational offerings include twenty fields. These are excellent terminal courses and make it possible for ambitious young people to get a start in the world of work. The evening school crowds the building to capacity, with waiting lists in many areas. After the day's work is over, some ten thousand people come to night school, breaking down the old theory of the psychologists that we cease to learn as we grow older.

*Carpentry, Milwaukee Vocational School*

### A Cosmopolitan Vocational School

A survey of such a large number of students is compelling. A wide variety of nationalities, capacities, ages, preparation, inclination, and objectives — these make for a cosmopolitan group wherein rank is forgotten, and all are intent on improvement. The faculty that can provide instruction in a school of this kind is likewise cosmopolitan in nature and democratic in spirit.

### Conclusion

The Milwaukee Vocational School has rounded a quarter century. No longer a stripling, but yet in the vigor of youth, it is still growing. Ever alert to the demands of a changing society, the instruction is modified to fit the needs of the times. This has been the constant effort of its founder, Dr. Robert L. Cooley, who has striven to build the curriculum on the needs of the students. In a very real sense, future generations will come to realize that this institution is but the lengthened shadow of a great man.

# Industrial Arts for Girls

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*A list of teaching units for an industrial-arts course for girls, developed through a research problem prepared under the direction of Professor W. L. Hunter, at Iowa State College, Ames, Iowa*

Although the adverse conditions of the past few years seem to have retarded the progress for an expanded industrial-arts curriculum, present indications point to forces now attempting to bring to fruition years of research for such a program. Therefore, as one aspect of such a program, this study has been made to help determine the content of a course in industrial arts for girls. To carry out such a study, it is necessary to evaluate those items of knowledge which should be known, and those items which should be learned, through manipulative processes. However, it may be advisable as a first step, to see wherein lies the basic philosophy for the inclusion of girls in an industrial-arts curriculum.

What are some of the significant influences that have taken place in the past to broaden the secondary-school curriculum? Possibly a few observations may help to give a better understanding of the entire problem.

The old, distinctive subject program of the secondary school is now losing favor, and courses of a general nature are coming into prominence. The straight academic courses cannot persist under our rapidly changing social order. No thoughtful person can ignore the fact that our entire secondary-school curriculum is attempting to meet a challenge which no other time

or age has had to face. It is almost an admitted fact that a greater number of children will continue on through high school than in any other period in our history. To give their children an education which only the more prosperous could embrace, became almost the criteria upon which success or failure of family life depended during the period in which our fathers lived. Because of parental persistence, that which prepared the employer's son for a profession was significantly important for the employee's son, also. This kind of subject evaluation has left the educational march of progress far behind the social and economic events of our time.

Therefore, one cannot go on without being cognizant of that very important institution, the home. For it is here where a great share of the influence toward a revised secondary curriculum must come. The importance of a study to determine what new needs must be met in the home today, brings one to face this fact, that the homemakers are living in a world quite unrelated in many respects to the industrial era from which we have been emerging. Boyd H. Bode[1] says that the home life was once a patriarchal pattern. Today that pattern has changed to one having freedom of thought and action. If these statements have any truth in them, then must not our educational pattern also change to meet this challenge? In just what respect shall this change come? Such a question has certainly challenged the best educators. Just as in industry men must ever be looking forward to see in what direction this mechanized age is turning, so, too, have educators been seeing significant curriculum trends moving out in various directions. The old, distinctive subject program need not be discarded, for, as Bennett has stated so aptly,[2] "New discoveries precipitate new problems. New conditions necessitate changes in procedure. This is just as true in teaching as it is in scientific investigation or in business. Any change in public sentiment, any growth in ideals calls for a corresponding change in the teacher's work." Progress is made not only in just looking ahead, but also by looking back, retaining that which is good and accepting the new with reservations.

## Bringing the Curriculum Up to Date

Someone has said that our ancestors made some of the essential tools of life, such as the arts of language, writing, etc., a synonym for everything dry, musty, and out of date. Why, then, have we not cast some of these elements into a mold from which they may be embodied into a more dynamic program? Why have educators been prone to leave subjects within the curriculum until they have become institutionalized and then failed to serve the larger group of students for whom they were originally intended?

There is, however, a very definite trend which points conclusively in one direction, by which L. V. Koos summarizes some pertinent facts. These should be familiar to every industrial-arts teacher and educator. He says, "the trends are in directions desired by advocates of curriculum reform; that is, they are in the direction of diversification of offering, which increases the opportunities to ascertain and to recognize individual differences among the increasingly diverse secondary-school population."

He now distinguishes between the junior- and senior-high-school curriculum trends. He states that, "the junior high school is a vehicle of curriculum innovation. The trends recognize the concepts of distinctive purposes of the junior high school, such as economy of time through enrichment of education at this level, exploration and guidance, and the recognition of the needs of the early adolescent." Then again he comments about the senior high school when he says, "the senior high school has unquestionably been moving toward opportunities for diversification for individual pupils, toward enrichment that gives greater recognition to immediate values than deferred values, and toward an experimentation with new content that is having a wholesome and constructive influence on the educational program."

## Results of Curriculum-Revision Efforts

What value have these observations been to the subject under consideration? There is a decided indication that the secondary-school curriculum is now being cast into that mold from which may emerge one with a dynamic influence. Such an educational curriculum would then be more concrete, more tangible, and deal with everyday life realities. Such a program not only meets the needs of the boy, but the girl as well. In the face of such a need, this research problem has been undertaken to help determine, "what girls should know and be able to do in order to be better homemakers."

Women of our homes today must deal with many new devices and inventions. They must cope with the problems of their environment which invention has filled with an ever-increasing multiplicity of devices. They are becoming more and more a partner of equal standing in the business of making the home a success, whether it is in the selection of a house design, a problem of interior decoration, or one of purchasing a new refrigerator. We have long realized that the woman in the home is the biggest purchasing agent since she spends the largest bulk of our national income. Every girl who leaves high school should have had a course in industrial arts, the purpose of which should be to take into consideration these very problems which she will meet as a prospective homemaker. What these problems are, may be readily understood by observing the proposed units of work. What is offered in any homemaking department will naturally be omitted in order to avoid duplication of material.

It is not the intention of the author in this short article to show how and where each of the units suggested should be taught. This study is only another attempt to meet the needs of those who have indicated a desire to broaden the scope of their industrial-arts curriculum. The bibliography, too, gives a rather comprehensive viewpoint of leaders in the field of industrial-arts education and those who are attempting to broaden the scope of their work by the inclusion of girls in their program. Therefore, the units given are only suggestions as to what girls should know and be able to do when making an evaluation which will, from an industrial-arts viewpoint, make the greatest contribution to the broader aims of a general education.

In order that this study may take some definite direction, eleven objectives are established. It will be found, in most instances, that the units contribute in some measure to these objectives.

### Objectives of an Industrial-Arts Course for Girls

1. To provide education in tasks of a mechanical nature adaptable to women around the home.
2. To provide adequate information and intelligent understanding of some of the common activities involved in our mechanized age.
3. To provide a more intelligent consumer knowledge pertaining to the more common activities found in modern domestic life.
4. To encourage and present a variety of possibilities which will serve as a basis for the development of hobbies.
5. To provide experiences in the use of a wide range of materials with actual participation in manipulative processes.
6. To provide an appreciation of our common industrial services and products.
7. To provide the necessary safety education for the use of common devices and mechanisms pertaining to ordinary domestic, industrial, and avocational life.
8. To help develop the ability to think,

[1]Bode, Boyd H., "Next Step in Education," *Journal of Home Economics*, 27:487–489, October, 1935.

[2]Bennett, Charles A., "One of our Problems: The Place of Skill in Manual Training," *Manual Training Magazine*, VII:121–127, April, 1906.

# Questionnaire and Summary of Results

**Directions for answering questionnaire:** Please check each of the following items in accord with your estimate of its possibility in accomplishing the objectives as set up. Check "Very important" (A) if the item contributes in a large measure to their accomplishment, and similarly for the other columns on the check list. Add any items which you think should be considered, to any one of the lists.

**KEY**

G - Groups answering questionnaire
P - Homes, Professional
I - Homes, Industrial
W - Wives of summer-school students
M - Minnesota Industrial-Arts Men
A - Very important
B - Important
C - Slight value

| Woodwork | G | A | B | C |
|---|---|---|---|---|
| 1. To be able to put up a shelf, using brackets, strips of wood, or both, and know under what conditions to use each | P | 4 | 17 | 4 |
| | I | 5 | 9 | 8 |
| | W | 2 | 13 | 10 |
| | M | 2 | 16 | 6 |
| 2. To know the common kinds of glass in every-day use | P | 5 | 11 | 4 |
| | I | 0 | 15 | 10 |
| | W | 1 | 9 | 12 |
| | M | 3 | 11 | 11 |
| 3. To repair upholstery | P | 3 | 20 | 2 |
| | I | 6 | 11 | 8 |
| | W | 4 | 17 | 4 |
| | M | 7 | 12 | 6 |
| 4. To know kinds and use of various glues | P | 4 | 10 | 11 |
| | I | 5 | 13 | 7 |
| | W | 0 | 13 | 12 |
| | M | 3 | 14 | 7 |
| 5. To know the proper use of sandpaper | P | 3 | 15 | 7 |
| | I | 1 | 16 | 7 |
| | W | 0 | 15 | 9 |
| | M | 2 | 20 | 3 |
| 6. To know the kinds of materials now used as substitutes for wood | P | 4 | 12 | 9 |
| | I | 5 | 9 | 10 |
| | W | 2 | 14 | 7 |
| | M | 3 | 14 | 8 |
| 7. To know the importance of forests in our early American history | P | 1 | 7 | 15 |
| | I | 0 | 14 | 7 |
| | W | 1 | 5 | 13 |
| | M | 3 | 4 | 13 |
| 8. To know how to use the common tools found in a home | P | 20 | 5 | 0 |
| | I | 12 | 13 | 0 |
| | W | 15 | 10 | 0 |
| | M | 14 | 8 | 3 |
| 9. To know the nature, value, and extent of Federal efforts toward forest preservation and reforestation | P | 7 | 9 | 7 |
| | I | 7 | 12 | 5 |
| | W | 3 | 7 | 10 |
| | M | 4 | 8 | 10 |
| 10. To know the causes of warpage, shrinkage, and other defects of lumber | P | 7 | 7 | 10 |
| | I | 4 | 9 | 11 |
| | W | 2 | 12 | 11 |
| | M | 6 | 10 | 7 |
| 11. To be able to use nails and screws properly | P | 12 | 11 | 2 |
| | I | 11 | 12 | 2 |
| | W | 7 | 17 | 1 |
| | M | 9 | 13 | 2 |
| 12. To be able to distinguish periods of furniture | P | 5 | 15 | 5 |
| | I | 3 | 11 | 11 |
| | W | 4 | 17 | 4 |
| | M | 9 | 10 | 5 |
| 13. To be able to repair broken furniture | P | 5 | 16 | 3 |
| | I | 5 | 15 | 5 |
| | W | 3 | 18 | 4 |
| | M | 3 | 12 | 9 |
| 14. To be able to tighten loose joints in furniture | P | 9 | 14 | 1 |
| | I | 6 | 15 | 4 |
| | W | 3 | 20 | 2 |
| | M | 4 | 13 | 7 |
| 15. To know the common laws regarding the purchase of furniture and other materials made of wood | P | 16 | 8 | 1 |
| | I | 11 | 12 | 2 |
| | W | 15 | 10 | 0 |
| | M | 13 | 10 | 2 |
| 16. To fill cracks in woodwork | P | 5 | 13 | 7 |
| | I | 6 | 12 | 7 |
| | W | 3 | 15 | 5 |
| | M | 2 | 15 | 7 |
| 17. To know the characteristics and be able to identify plain and quarter-sawed wood | P | 2 | 9 | 12 |
| | I | 4 | 10 | 11 |
| | W | 1 | 8 | 13 |
| | M | 2 | 8 | 12 |
| 18. To be able to intelligently select proper wood for common needs | P | 10 | 11 | 3 |
| | I | 5 | 15 | 5 |
| | W | 4 | 14 | 6 |
| | M | 6 | 13 | 3 |
| 19. To know the effect of humidity on furniture | P | 15 | 10 | 0 |
| | I | 15 | 9 | 1 |
| | W | 13 | 10 | 2 |
| | M | 19 | 6 | 0 |
| 20. To know how to care for different furniture finishes | P | 18 | 7 | 0 |
| | I | 14 | 11 | 0 |
| | W | 16 | 6 | 1 |
| | M | 19 | 6 | 0 |
| 21. To know how to treat scratches and white marks due to hot dishes | P | 17 | 7 | 1 |
| | I | 14 | 11 | 0 |
| | W | 17 | 8 | 0 |
| | M | 14 | 11 | 0 |
| 22. To know how to properly care for varnished floors | P | 17 | 8 | 0 |
| | I | 14 | 10 | 1 |
| | W | 17 | 8 | 0 |
| | M | 19 | 6 | 0 |
| 23. To know how to frame a picture | P | 2 | 13 | 8 |
| | I | 5 | 10 | 10 |
| | W | 2 | 12 | 10 |
| | M | 1 | 9 | 9 |
| 24. To know the names of the most common hardward items found in the home | P | 10 | 12 | 2 |
| | I | 7 | 17 | 1 |
| | W | 8 | 14 | 3 |
| | M | 4 | 16 | 5 |
| 25. To know how to remove scratches from furniture | P | 16 | 7 | 2 |
| | I | 12 | 13 | 0 |
| | W | 14 | 11 | 0 |
| | M | 13 | 11 | 1 |
| 26. To know how to take care of a sag in a screen door | P | 1 | 18 | 5 |
| | I | 6 | 12 | 7 |
| | W | 1 | 18 | 5 |
| | M | 1 | 17 | 4 |
| 27. To know how to use plastic wood | P | 0 | 12 | 13 |
| | I | 2 | 14 | 9 |
| | W | 2 | 13 | 9 |
| | M | 1 | 10 | 11 |
| 28. To know how to sound studdings for driving nails | P | 6 | 10 | 5 |
| | I | 6 | 12 | 6 |
| | W | 8 | 15 | 2 |
| | M | 9 | 10 | 4 |
| 29. To know how to read a common rule for measuring | P | 13 | 10 | 2 |
| | I | 10 | 13 | 2 |
| | W | 15 | 9 | 1 |
| | M | 15 | 5 | 5 |

| Plumbing | G | A | B | C |
|---|---|---|---|---|
| 1. To know how to shut off water ahead of meter and drain water system | P | 16 | 9 | 0 |
| | I | 12 | 11 | 2 |
| | W | 17 | 8 | 0 |
| | M | 17 | 7 | 1 |
| 2. To be able to read a water meter | P | 3 | 12 | 8 |
| | I | 5 | 15 | 5 |
| | W | 2 | 15 | 7 |
| | M | 6 | 10 | 9 |
| 3. To understand the relationship between health and modern methods of sanitation | P | 18 | 5 | 2 |
| | I | 16 | 7 | 2 |
| | W | 19 | 6 | 0 |
| | M | 17 | 8 | 0 |
| 4. To appreciate and understand the value of good plumbing and plumbers to society | P | 6 | 12 | 7 |
| | I | 5 | 17 | 3 |
| | W | 8 | 13 | 3 |
| | M | 8 | 14 | 2 |
| 5. To replace a fuller ball in a faucet | P | 1 | 10 | 14 |
| | I | 7 | 12 | 6 |
| | W | 0 | 13 | 11 |
| | M | 3 | 10 | 9 |
| 6. To clean a drain pipe | P | 8 | 11 | 5 |
| | I | 11 | 11 | 3 |
| | W | 10 | 10 | 5 |
| | M | 7 | 11 | 5 |
| 7. To be able to remove stains from porcelain | P | 13 | 12 | 0 |
| | I | 12 | 13 | 0 |
| | W | 16 | 8 | 1 |
| | M | 12 | 10 | 3 |
| 8. To know how to care for bath and kitchen enameled fixtures | P | 16 | 13 | 0 |
| | I | 14 | 11 | 0 |
| | W | 19 | 6 | 0 |
| | M | 16 | 8 | 1 |
| 9. To know how to mend temporarily with soap a small leak in gas or water pipe | P | 11 | 10 | 4 |
| | I | 11 | 13 | 1 |
| | W | 9 | 15 | 1 |
| | M | 7 | 14 | 4 |
| 10. To know how to thaw out a frozen pump or water pipe | P | 8 | 10 | 7 |
| | I | 11 | 10 | 4 |
| | W | 7 | 16 | 2 |
| | M | 5 | 10 | 7 |
| 11. To know how to adjust valve and be able to repair a leaky float in flushing tank | P | 5 | 8 | 11 |
| | I | 8 | 10 | 7 |
| | W | 7 | 9 | 9 |
| | M | 3 | 16 | 4 |

| Electricity | G | A | B | C |
|---|---|---|---|---|
| 1. To know how to make and repair an extension cord | P | 8 | 14 | 2 |
| | I | 9 | 13 | 3 |
| | W | 12 | 12 | 2 |
| | M | 11 | 13 | 1 |
| 2. To know how to figure comparative costs of operation of various electrical devices | P | 8 | 12 | 5 |
| | I | 6 | 18 | 1 |
| | W | 11 | 11 | 3 |
| | M | 7 | 11 | 3 |
| 3. To be able to read an electric meter | P | 7 | 12 | 6 |
| | I | 7 | 13 | 5 |
| | W | 4 | 15 | 6 |
| | M | 7 | 10 | 8 |
| 4. To be able to figure lighting requirements | P | 7 | 14 | 4 |
| | I | 6 | 13 | 6 |
| | W | 7 | 11 | 7 |
| | M | 7 | 8 | 9 |
| 5. To know how to use the common mechanisms and devices for the control of the electrical current in the home | P | 12 | 9 | 4 |
| | I | 13 | 12 | 0 |
| | W | 7 | 14 | 2 |
| | M | 12 | 8 | 4 |
| 6. To know how to wire a light socket | P | 3 | 10 | 11 |
| | I | 6 | 16 | 3 |
| | W | 3 | 7 | 15 |
| | M | 4 | 17 | 4 |
| 7. To know the durability and efficiency of the various brands of electrical devices used in the home | P | 11 | 10 | 4 |
| | I | 7 | 17 | 1 |
| | W | 10 | 15 | 0 |
| | M | 12 | 9 | 3 |
| 8. To know the events and milestones in the history and development of the electrical industry | P | 0 | 6 | 16 |
| | I | 2 | 8 | 14 |
| | W | 0 | 8 | 11 |
| | M | 1 | 6 | 13 |
| 9. To know how to test for a blown fuse | P | 11 | 11 | 3 |
| | I | 8 | 16 | 1 |
| | W | 13 | 11 | 0 |
| | M | 11 | 11 | 2 |
| 10. To know how to connect dry cells | P | 1 | 10 | 14 |
| | I | 3 | 14 | 8 |
| | W | 1 | 10 | 9 |
| | M | 1 | 9 | 11 |
| 11. To know how to lubricate household motors | P | 15 | 10 | 0 |
| | I | 13 | 12 | 0 |
| | W | 19 | 6 | 0 |
| | M | 16 | 6 | 3 |
| 12. To know the meaning and use of common terms found in electricity | P | 3 | 18 | 4 |
| | I | 7 | 13 | 5 |
| | W | 5 | 10 | 8 |
| | M | 1 | 12 | 10 |
| 13. To know how to wire an electric lamp | P | 1 | 9 | 13 |
| | I | 10 | 7 | 8 |
| | W | 3 | 7 | 13 |
| | M | 2 | 13 | 9 |
| 14. To know how to refill a fuse receptacle | P | 7 | 13 | 2 |
| | I | 13 | 11 | 1 |
| | W | 11 | 6 | 6 |
| | M | 12 | 9 | 4 |
| 15. To know how to change batteries and bulbs in a flashlight | P | 6 | 14 | 4 |
| | I | 7 | 12 | 5 |
| | W | 7 | 14 | 3 |
| | M | 8 | 12 | 4 |
| 16. To understand simple electric circuits | P | 4 | 12 | 9 |
| | I | 7 | 12 | 6 |
| | W | 2 | 16 | 6 |
| | M | 2 | 13 | 7 |
| 17. To properly appreciate the services and products of electricians and the electrical industry | P | 4 | 12 | 9 |
| | I | 7 | 12 | 6 |
| | W | 6 | 13 | 6 |
| | M | 4 | 14 | 5 |

| Electricity (Continued) | G | A | B | C |
|---|---|---|---|---|
| 18. To be able to repair iron, toaster, etc. | P | 4 | 14 | 6 |
| | I | 10 | 12 | 3 |
| | W | 6 | 13 | 6 |
| | M | 2 | 10 | 11 |
| 19. To know what care should be given to a cord of a washing machine, iron, etc. | P | 19 | 6 | 0 |
| | I | 15 | 10 | 0 |
| | W | 20 | 5 | 0 |
| | M | 17 | 8 | 0 |
| 20. To know the elementary principles of radio installation | P | 2 | 15 | 7 |
| | I | 1 | 14 | 8 |
| | W | 0 | 10 | 14 |
| | M | 1 | 14 | 6 |
| 21. To know the measuring units of electricity and how to use them | P | 3 | 13 | 8 |
| | I | 1 | 13 | 10 |
| | W | 0 | 13 | 10 |
| | M | 1 | 6 | 14 |
| 22. To know the danger in handling an electric cord, switch, or connection when hands or body are wet | P | 23 | 2 | 0 |
| | I | 21 | 4 | 0 |
| | W | 23 | 2 | 0 |
| | M | 23 | 1 | 1 |
| 23. To know the danger in attempting rescue of one in contact with a live wire | P | 24 | 1 | 0 |
| | I | 23 | 2 | 0 |
| | W | 24 | 1 | 0 |
| | M | 24 | 1 | 0 |
| 24. To know the Schafer prone pressure method of resuscitating a person insensible from electric shock | P | 16 | 9 | 0 |
| | I | 23 | 2 | 0 |
| | W | 19 | 5 | 1 |
| | M | 13 | 11 | 1 |
| 25. To know the danger of improperly placed electric fixtures | P | 19 | 6 | 0 |
| | I | 23 | 2 | 0 |
| | W | 19 | 5 | 1 |
| | M | 19 | 6 | 0 |

| Automobile Knowledge | G | A | B | C |
|---|---|---|---|---|
| 1. To know about battery care | P | 7 | 13 | 5 |
| | I | 8 | 13 | 4 |
| | W | 5 | 13 | 7 |
| | M | 8 | 15 | 1 |
| 2. To know what oils to use for specific seasons | P | 9 | 12 | 4 |
| | I | 8 | 15 | 2 |
| | W | 5 | 17 | 3 |
| | M | 7 | 14 | 3 |
| 3. To understand the principle of the cooling system | P | 4 | 14 | 7 |
| | I | 6 | 15 | 4 |
| | W | 1 | 11 | 12 |
| | M | 4 | 14 | 7 |
| 4. To know how to change a tire | P | 14 | 11 | 0 |
| | I | 14 | 10 | 1 |
| | W | 15 | 10 | 0 |
| | M | 13 | 10 | 1 |
| 5. To be able to read the instrument panel | P | 15 | 10 | 0 |
| | I | 15 | 9 | 1 |
| | W | 18 | 7 | 0 |
| | M | 15 | 10 | 0 |
| 6. To know how to jack a car safely | P | 16 | 9 | 0 |
| | I | 12 | 12 | 1 |
| | W | 13 | 11 | 1 |
| | M | 14 | 9 | 2 |
| 7. To know the dangers from monoxide gas | P | 23 | 2 | 0 |
| | I | 22 | 3 | 0 |
| | W | 24 | 1 | 0 |
| | M | 23 | 1 | 0 |
| 8. To know the proper ventilation of a garage | P | 15 | 10 | 0 |
| | I | 13 | 10 | 2 |
| | W | 11 | 12 | 2 |
| | M | 13 | 9 | 2 |
| 9. To know at what speed a car operates most economically | P | 9 | 14 | 2 |
| | I | 13 | 11 | 1 |
| | W | 11 | 12 | 2 |
| | M | 9 | 15 | 1 |
| 10. To know and understand how the automobile has brought about some of the social changes in our society | P | 2 | 11 | 10 |
| | I | 2 | 13 | 10 |
| | W | 1 | 8 | 14 |
| | M | 3 | 15 | 7 |
| 11. To know the distance required to stop at different speeds while driving | P | 17 | 8 | 0 |
| | I | 18 | 6 | 1 |
| | W | 14 | 7 | 4 |
| | M | 16 | 8 | 1 |
| 12. To know the interest rate of installment buying | P | 13 | 10 | 2 |
| | I | 11 | 11 | 3 |
| | W | 9 | 12 | 4 |
| | M | 13 | 10 | 1 |
| 13. To know the operation cost of a car | P | 13 | 11 | 1 |
| | I | 15 | 9 | 1 |
| | W | 10 | 13 | 2 |
| | M | 8 | 15 | 1 |
| 14. To understand the various kinds of automobile insurance available | P | 13 | 11 | 1 |
| | I | 10 | 14 | 1 |
| | W | 8 | 15 | 2 |
| | M | 6 | 17 | 2 |
| 15. To know the causes of the many kinds of accidents | P | 18 | 8 | 1 |
| | I | 15 | 10 | 0 |
| | W | 10 | 13 | 2 |
| | M | 15 | 8 | 2 |
| 16. To know the value and importance of our industrial changes because of the automobile | P | 0 | 11 | 13 |
| | I | 1 | 12 | 12 |
| | W | 0 | 8 | 12 |
| | M | 3 | 12 | 7 |
| 17. To know the time of the greatest number of accidents | P | 8 | 11 | 6 |
| | I | 8 | 13 | 4 |
| | W | 6 | 13 | 5 |
| | M | 5 | 10 | 8 |
| 18. To realize and understand some of the problems confronted by our transportation system because of the automobile | P | 4 | 12 | 9 |
| | I | 6 | 12 | 6 |
| | W | 2 | 9 | 9 |
| | M | 5 | 10 | 8 |
| 19. To know the correct manipulation of a car with respect to the application of brakes, coasting down hill, use of rear-view mirror, and windshield wiper | P | 20 | 4 | 1 |
| | I | 24 | 1 | 0 |
| | W | 20 | 4 | 1 |
| | M | 22 | 2 | 1 |
| 20. To know the proper driving condition of a car with respect to | P | 22 | 3 | 0 |
| | I | 21 | 4 | 0 |

| Automobile Knowledge (Continued) | G | A | B | C |
|---|---|---|---|---|
| its brakes, lights, windshield, side windows, tires, and motor | W | 22 | 2 | 2 |
| | M | 21 | 4 | 0 |
| 21. To know the signals for stopping at intersections and railroad crossings | P | 23 | 2 | 0 |
| | I | 28 | 3 | 0 |
| | W | 22 | 3 | 0 |
| | M | 23 | 3 | 0 |
| 22. To know the proper method of parking a car with respect to the distance from the curb, near the corner, pulling out when leaving, and parking near a hydrant | P | 20 | 4 | 1 |
| | I | 18 | 7 | 0 |
| | W | 21 | 3 | 1 |
| | M | 20 | 5 | 0 |
| 23. To know the hazards regarding failure to stop at signals, turning between intersections, weaving, leaving a car unattended, operation on wet or icy pavement, following too closely, passing parked cars, cutting in, and clearance in traffic | P | 21 | 4 | 0 |
| | I | 20 | 4 | 1 |
| | W | 21 | 3 | 1 |
| | M | 23 | 2 | 0 |
| 24. To know the common courtesies to drivers of other vehicles | P | 14 | 11 | 0 |
| | I | 11 | 13 | 1 |
| | W | 11 | 13 | 1 |
| | M | 13 | 12 | 0 |
| 25. To know how to care for an automobile radiator during sub-freezing temperatures | P | 17 | 7 | 1 |
| | I | 15 | 8 | 2 |
| | W | 13 | 10 | 2 |
| | M | 14 | 11 | 0 |

| House Construction | G | A | B | C |
|---|---|---|---|---|
| 1. To know the periods of development in the evolution of the American home | P | 1 | 6 | 17 |
| | I | 3 | 11 | 10 |
| | W | 2 | 10 | 11 |
| | M | 2 | 14 | 6 |
| 2. To know the most common types of architecture found in our American homes | P | 2 | 19 | 4 |
| | I | 3 | 16 | 6 |
| | W | 3 | 15 | 7 |
| | M | 8 | 14 | 3 |
| 3. To know the present-day trends in home building | P | 9 | 14 | 2 |
| | I | 8 | 14 | 3 |
| | W | 7 | 15 | 3 |
| | M | 17 | 7 | 1 |
| 4. To know the present-day methods of financing the building of a home | P | 15 | 9 | 1 |
| | I | 12 | 11 | 2 |
| | W | 11 | 14 | 0 |
| | M | 17 | 6 | 2 |
| 5. To know what recent developments in modern heating, lighting, and refrigeration should be considered essential for the comfort, health, and happiness of the average American home | P | 16 | 9 | 0 |
| | I | 16 | 8 | 1 |
| | W | 16 | 9 | 0 |
| | M | 16 | 8 | 1 |
| 6. To know legal documents as abstracts and deeds in the buying of a home | P | 14 | 10 | 1 |
| | I | 18 | 6 | 1 |
| | W | 11 | 13 | 1 |
| | M | 18 | 9 | 3 |
| 7. To know the kinds of building insulation | P | 8 | 16 | 1 |
| | I | 9 | 11 | 5 |
| | W | 9 | 12 | 5 |
| | M | 7 | 18 | 5 |
| 8. To know the kinds of building material now available | P | 7 | 15 | 5 |
| | I | 8 | 13 | 4 |
| | W | 8 | 13 | 4 |
| | M | 7 | 14 | 2 |

| Miscellaneous Items | G | A | B | C |
|---|---|---|---|---|
| 1. To know how to adjust roller-curtain springs | P | 13 | 10 | 2 |
| | I | 9 | 14 | 2 |
| | W | 11 | 13 | 0 |
| | M | 14 | 10 | 2 |
| 2. To be able to remove wall paper | P | 0 | 16 | 8 |
| | I | 4 | 13 | 8 |
| | W | 1 | 14 | 8 |
| | M | 1 | 17 | 7 |
| 3. To sharpen and adjust common edge tools found in the ordinary home and garden (knives, scissors, lawn mower, etc.) | P | 9 | 12 | 3 |
| | I | 6 | 15 | 4 |
| | W | 5 | 18 | 2 |
| | M | 5 | 10 | 9 |
| 4. To know how to clean polished wood carving, ivory, and marble | P | 9 | 14 | 2 |
| | I | 8 | 15 | 2 |
| | W | 4 | 17 | 4 |
| | M | 6 | 13 | 5 |
| 5. To be able to put up a rod in clothes closet | P | 7 | 17 | 0 |
| | I | 6 | 14 | 5 |
| | W | 3 | 19 | 3 |
| | M | 0 | 21 | 2 |
| 6. To be able to put in clothes hooks and space them properly | P | 8 | 15 | 0 |
| | I | 6 | 16 | 3 |
| | W | 3 | 19 | 3 |
| | M | 1 | 20 | 4 |
| 7. To attach connections to a garden hose | P | 5 | 16 | 3 |
| | I | 7 | 16 | 2 |
| | W | 4 | 17 | 4 |
| | M | 2 | 16 | 7 |
| 8. To know how to prevent rust | P | 13 | 11 | 1 |
| | I | 12 | 11 | 2 |
| | W | 11 | 14 | 0 |
| | M | 6 | 18 | 1 |

| Miscellaneous Items (Continued) | G | A | B | C |
|---|---|---|---|---|
| 9. To be able to place washers in hose connections | P | 4 | 14 | 7 |
| | I | 8 | 15 | 2 |
| | W | 3 | 18 | 4 |
| | M | 4 | 18 | 3 |
| 10. To know how to put in a gas mantle | P | 1 | 11 | 11 |
| | I | 5 | 15 | 4 |
| | W | 1 | 5 | 16 |
| | M | 2 | 9 | 14 |
| 11. To know how to rewick an oil stove | P | 8 | 13 | 3 |
| | I | 7 | 11 | 6 |
| | W | 3 | 9 | 13 |
| | M | 4 | 17 | 3 |
| 12. To know what alloys do not rust | P | 4 | 13 | 7 |
| | I | 4 | 12 | 8 |
| | W | 6 | 12 | 7 |
| | M | 3 | 11 | 10 |
| 13. To know how to mend dishes, glassware, etc. | P | 5 | 6 | 12 |
| | I | 7 | 10 | 8 |
| | W | 3 | 14 | 6 |
| | M | 3 | 12 | 9 |
| 14. To know how to put in curtain rods | P | 12 | 13 | 0 |
| | I | 12 | 10 | 3 |
| | W | 5 | 19 | 1 |
| | M | 8 | 14 | 3 |
| 15. To know how to fasten slides to furniture | P | 4 | 14 | 7 |
| | I | 7 | 12 | 6 |
| | W | 3 | 17 | 3 |
| | M | 3 | 16 | 5 |
| 16. To know how to loosen sticky window sash | P | 8 | 12 | 5 |
| | I | 6 | 17 | 2 |
| | W | 6 | 16 | 3 |
| | M | 8 | 16 | 2 |
| 17. To know how to remove paint from glass | P | 9 | 15 | 1 |
| | I | 11 | 13 | 1 |
| | W | 7 | 17 | 1 |
| | M | 6 | 19 | 0 |
| 18. To understand the principles involved in selecting various equipment for the home | P | 21 | 4 | 0 |
| | I | 14 | 10 | 1 |
| | W | 18 | 7 | 0 |
| | M | 15 | 8 | 2 |
| 19. To repair broken plaster | P | 3 | 15 | 6 |
| | I | 4 | 13 | 8 |
| | W | 3 | 10 | 11 |
| | M | 1 | 15 | 7 |
| 20. To know how to hang pictures properly | P | 20 | 5 | 0 |
| | I | 11 | 14 | 0 |
| | W | 11 | 13 | 1 |
| | M | 15 | 9 | 1 |
| 21. To know what kind of steel stays sharp | P | 6 | 12 | 5 |
| | I | 5 | 14 | 5 |
| | W | 7 | 16 | 2 |
| | M | 8 | 12 | 4 |
| 22. To be able to tie some of the common knots | P | 5 | 16 | 4 |
| | I | 5 | 14 | 5 |
| | W | 6 | 12 | 7 |
| | M | 2 | 15 | 7 |
| 23. To know how to hang window shades | P | 13 | 11 | 1 |
| | I | 10 | 13 | 2 |
| | W | 5 | 17 | 3 |
| | M | 4 | 17 | 4 |
| 24. To know how to properly lay linoleum | P | 8 | 10 | 6 |
| | I | 9 | 13 | 2 |
| | W | 3 | 13 | 8 |
| | M | 3 | 14 | 5 |
| 25. To know how to put up a clothes line | P | 10 | 12 | 1 |
| | I | 11 | 13 | 1 |
| | W | 7 | 18 | 0 |
| | M | 8 | 14 | 3 |
| 26. To know how to put up roller curtains | P | 7 | 12 | 5 |
| | I | 10 | 12 | 3 |
| | W | 6 | 16 | 3 |
| | M | 6 | 15 | 3 |
| 27. To know how to wrap, tie, and address a package properly | P | 20 | 5 | 0 |
| | I | 15 | 10 | 0 |
| | W | 14 | 11 | 0 |
| | M | 17 | 7 | 1 |
| 28. To know how to clean the bottom of an electric iron | P | 16 | 8 | 1 |
| | I | 13 | 11 | 1 |
| | W | 14 | 11 | 0 |
| | M | 17 | 7 | 1 |

| Household Safety | G | A | B | C |
|---|---|---|---|---|
| 1. To know how to use a fire extinguisher | P | 21 | 4 | 0 |
| | I | 20 | 5 | 0 |
| | W | 19 | 6 | 0 |
| | M | 22 | 3 | 0 |
| 2. To know how to put out a fire under varied conditions | P | 20 | 5 | 0 |
| | I | 20 | 5 | 0 |
| | W | 21 | 4 | 0 |
| | M | 23 | 2 | 0 |
| 3. To know how to avoid slippery floors | P | 16 | 9 | 0 |
| | I | 15 | 10 | 0 |
| | W | 16 | 8 | 1 |
| | M | 16 | 7 | 0 |
| 4. To know how to avoid icy steps and walks | P | 17 | 8 | 0 |
| | I | 15 | 7 | 0 |
| | W | 16 | 9 | 0 |
| | M | 16 | 7 | 0 |
| 5. To know the danger of poorly lighted stairs | P | 15 | 8 | 0 |
| | I | 16 | 7 | 0 |
| | W | 16 | 8 | 0 |

| Household Safety (Continued) | G | A | B | C |
|---|---|---|---|---|
| | M | 19 | 6 | 0 |
| 6. To know how to avoid slippery rugs | P | 15 | 9 | 1 |
| | I | 18 | 7 | 0 |
| | W | 15 | 9 | 1 |
| | M | 19 | 6 | 0 |
| 7. To know the danger in the absence of hand rail on basement steps | P | 16 | 8 | 1 |
| | I | 19 | 7 | 0 |
| | W | 16 | 8 | 0 |
| | M | 20 | 5 | 0 |

| Graphic Arts and Design | G | A | B | C |
|---|---|---|---|---|
| 1. To know how to do freehand drawing | P | 1 | 12 | 12 |
| | I | 2 | 7 | 14 |
| | W | 0 | 7 | 14 |
| | M | 3 | 14 | 4 |
| 2. To know how to do pictorial drawing | P | 0 | 8 | 17 |
| | I | 1 | 9 | 13 |
| | W | 0 | 6 | 13 |
| | M | 2 | 12 | 11 |
| 3. To know the general principles of esthetic and structural design | P | 3 | 13 | 8 |
| | I | 1 | 9 | 13 |
| | W | 3 | 9 | 12 |
| | M | 5 | 14 | 4 |
| 4. To know how to make diagrams and charts | P | 4 | 11 | 6 |
| | I | 4 | 11 | 8 |
| | W | 0 | 6 | 16 |
| | M | 6 | 11 | 6 |
| 5. To know how to interpret graphs and diagrams found in magazines | P | 9 | 13 | 3 |
| | I | 6 | 11 | 7 |
| | W | 3 | 13 | 8 |
| | M | 11 | 13 | 0 |
| 6. To know how to make and read floor plans | P | 4 | 17 | 3 |
| | I | 4 | 13 | 7 |
| | W | 3 | 18 | 3 |
| | M | 8 | 16 | 1 |
| 7. To know how to make lettered posters | P | 2 | 6 | 17 |
| | I | 2 | 9 | 13 |
| | W | 1 | 10 | 13 |
| | M | 0 | 4 | 17 |

| Painting, Finishing, and Decorating | G | A | B | C |
|---|---|---|---|---|
| 1. To know how to apply transfers and stencils | P | 6 | 12 | 6 |
| | I | 5 | 10 | 10 |
| | W | 3 | 16 | 5 |
| | M | 4 | 15 | 4 |
| 2. To know how to clean painted walls and wall paper | P | 17 | 8 | 0 |
| | I | 13 | 12 | 0 |
| | W | 14 | 11 | 0 |
| | M | 16 | 9 | 0 |
| 3. To know how to refinish furniture | P | 10 | 12 | 3 |
| | I | 9 | 14 | 2 |
| | W | 9 | 13 | 3 |
| | M | 5 | 17 | 3 |
| 4. To know how to stain, rub down, and wax unfinished woods | P | 5 | 17 | 2 |
| | I | 6 | 16 | 1 |
| | W | 8 | 12 | 4 |
| | M | 4 | 16 | 4 |
| 5. To know how to paint woodwork | P | 12 | 12 | 0 |
| | I | 12 | 13 | 0 |
| | W | 8 | 15 | 1 |
| | M | 11 | 13 | 0 |
| 6. To know how to varnish woodwork | P | 11 | 13 | 0 |
| | I | 12 | 13 | 0 |
| | W | 8 | 16 | 1 |
| | M | 10 | 12 | 3 |
| 7. To know how to varnish floors | P | 14 | 9 | 1 |
| | I | 11 | 14 | 0 |
| | W | 10 | 14 | 1 |
| | M | 9 | 15 | 1 |
| 8. To know the economic, esthetic, and health value of various kinds and colors of finishes | P | 7 | 16 | 2 |
| | I | 6 | 16 | 5 |
| | W | 7 | 14 | 3 |
| | M | 12 | 11 | 2 |
| 9. To know how to varnish linoleum | P | 14 | 10 | 1 |
| | I | 12 | 13 | 0 |
| | W | 9 | 15 | 0 |
| | M | 11 | 12 | 1 |
| 10. To know how to apply wax | P | 13 | 10 | 2 |
| | I | 10 | 15 | 0 |
| | W | 10 | 14 | 1 |
| | M | 14 | 11 | 0 |
| 11. To know how to paint metal furniture | P | 5 | 17 | 3 |
| | I | 9 | 15 | 1 |
| | W | 5 | 19 | 0 |
| | M | 7 | 14 | 3 |
| 12. To know how to fill cracks in floors | P | 4 | 18 | 3 |
| | I | 9 | 13 | 3 |
| | W | 6 | 17 | 1 |
| | M | 3 | 18 | 3 |
| 13. To know how to clean brushes | P | 13 | 11 | 1 |
| | I | 10 | 14 | 1 |
| | W | 10 | 14 | 0 |
| | M | 10 | 14 | 1 |
| 14. To know how to apply stains | P | 7 | 16 | 2 |
| | I | 9 | 16 | 0 |
| | W | 5 | 19 | 0 |
| | M | 6 | 15 | 1 |

reason, or solve problems pertinent to active participation in industrial and social life.

9. To provide avocational interests leading to the possible discovery of aptitude traits by guidance through broad occupational contacts and studies.
10. To provide correlation with other vital studies found in the school curriculum.
11. To assist in establishing proper attitudes, habits, and ideals in the social and economic relationships of life.

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The units were prepared and submitted for evaluation in the following manner:

1. The first list was started by a graduate class in industrial-arts research of which the author was a member.

2. All available literature bearing on this subject, such as girl-scout literature, homemaking courses, etc., was reviewed for possible source material. Included herein, was a list of units which was not included in the author's list, compiled by a graduate class of industrial-arts students under the supervision of Dr. Homer J. Smith, at the University of Minnesota.

3. This final list of units was then tabulated under proper headings and submitted to twenty-five wives of the industrial-arts graduate students at Iowa State College.

4. Another group of twenty-five progressive industrial-arts teachers of Minnesota, scattered throughout the state, also gave their evaluation of the units in terms of importance.

5. Finally, fifty homes were personally canvassed for their opinions on the list of units. Twenty-five homes represented the professional group and twenty-five represented the industrial-vocational group. Each home was selected at random in three communities.

6. A rank order summary was then prepared from the one hundred respondents. This final list of units, as here submitted, may indicate to some degree the order in which they should be taught.

### Units Arranged According to Rank Order

1. To know the danger in attempting rescue of one in contact with a live wire.
2. To know the signals for stopping at intersections and railroad crossings.
3. To know the dangers from monoxide gas.
4. To know the danger in handling an electric cord, switch, or connection when hands or body are wet.
5. To know the proper driving condition of a car with respect to its brakes, lights, windshield, side windows, tires, and motor.
6. To know how to put out a fire under varied conditions.
7. To know the correct manipulation of a car with respect to the application of brakes, coasting down hill, use of a rear-view mirror, and windshield wiper.
8. To know the hazards regarding failure to stop at signals, turning between intersections, weaving, leaving a car unattended, operation on wet or icy pavement, following too closely, passing parked cars, cutting in, and clearance in traffic.
9. To know how to use the fire extinguisher.
10. To know the danger of improperly placed electrical fixtures.
11. To know the proper method of parking a car with respect to the distance from the curb, near the corner, pulling out when leaving, and parking near a hydrant.
12. To know how to care for bath and kitchen enameled fixtures.
13. To know what care should be given to a cord of a washing machine, iron, etc.
14. To know the danger in the absence of hand rail on basement steps.
15. To know the Shafer Prone Pressure Method of resuscitating a person insensible from electric shock.
16. To know how to care for different furniture finishes.
17. To know how to properly care for varnished floors.
18. To understand the relationship between health and modern methods of sanitation.
19. To understand the principles involved in selecting various equipment for the home.
20. To know how to avoid slippery rugs.
21. To know how to wrap, tie, and address a package properly.
22. To know how to avoid slippery floors.
23. To know what recent developments in modern heating, lighting, and refrigeration should be considered essential for the comfort, health, and happiness of the average American home.
24. To be able to read the instrument panel on a car.
25. To know the danger of poorly lighted stairs.
26. To know how to treat scratches and white marks due to hot dishes.
27. To know how to avoid icy steps and walks.
28. To know how to lubricate household motors.
29. To know how to clean painted walls and wallpaper.
30. To know the effect of humidity on furniture.
31. To know how to shut off water ahead of meter and drain water system.
32. To know the distance required to stop at different speeds while driving.
33. To know how to use the common tools found in a home.
34. To know how to clean the bottom of an electric iron.
35. To know how to hang pictures properly.
36. To know how to care for an automobile radiator during subfreezing temperatures.
37. To know how to change a tire.
38. To know how to remove scratches from furniture.
39. To know how to jack a car safely.
40. To know the causes of the many kinds of accidents.
41. To know the present-day methods of financing of the building of a home.
42. To know the common laws regarding the purchase of furniture and other materials made of wood.
43. To be able to remove stains from porcelain.
44. To know legal documents, as abstracts and deeds, in the buying of a home.
45. To know the common courtesies to drivers of other vehicles.
46. To know the proper ventilation of a garage.
47. To know how to apply wax.
48. To know how to read a common rule for measuring.
49. To know how to adjust roller curtain springs.
50. To know how to varnish linoleum.
51. To know the operation cost of a car.
52. To know how to varnish floors.
53. To know how to clean brushes.
54. To know how to prevent rust.
55. To know how to paint woodwork.
56. To know at what speed a car operates most economically.
57. To know how to varnish woodwork.
58. To know the interest rate of installment buying.
59. To know how to test for a blown fuse.
60. To know how to make and repair an extension cord.
61. To know the present-day trends in home building.
62. To understand the various kinds of automobile insurance available.
63. To know the durability and efficiency of the various brands of electrical devices used in the home.
64. To know how to put in curtain rods.
65. To be able to use nails and screws properly.
66. To know how to remove paint from glass.
67. To know how to put up a clothesline.
68. To know how to mend a small leak in gas or water pipe temporarily with soap.
69. To know how to use the common mechanisms and devices for the control of the electrical current in the home.
70. To know how to use paint and varnish removers.
71. To know how to hang window shades.
72. To know how to refinish furniture.
73. To know the economic, esthetic, and health values of various kinds and colors of finishes.
74. To know how to refill a fuse receptacle.
75. To know the names of the most common hardware items found in the home.
76. To know how to apply stains.
77. To know what oils to use for specific seasons.
78. To know how to paint metal furniture.
79. To know how to figure comparative costs of operation of various electrical devices.
80. To know the kinds of building insulation.
81. To clean a drain pipe.
82. To know how to loosen sticky window sash.
83. To know how to clean polished wood carving, ivory, and marble.
84. To know the kinds of building material now available.
85. To know how to put up roller curtains.
86. To know about battery care.
87. To appreciate and understand the value of good plumbing and plumbers to society.
88. To know how to stain, rub down, and wax unfinished woods.
89. To know how to sound studdings for driving nails.
90. To know how to thaw out a frozen pump or water pipe.
91. To know how to interpret graphs and diagrams found in magazines.
92. To be able to put in clothes hooks and space them properly.
93. To be able to tighten loose joints in furniture.
94. To know how to change batteries and bulbs in a flashlight.
95. To be able to place washers in hose connections.
96. To sharpen and adjust common edge tools found in the ordinary home and garden (knives, scissors, lawnmower, etc.).
97. To know how to fill cracks in floors.
98. To know what kind of steel stays sharp.
99. To be able to read an electric meter.
100. To repair upholstery.
101. To attach connections to a garden hose.
102. To be able to put up a rod in a clothes closet.
103. To know the time of the greatest number of accidents.
104. To be able to figure lighting requirements.
105. To be able to intelligently select proper wood for common needs.

106. To know the most common types of architecture found in our American homes.
107. To know how to make and read floor plans.
108. To be able to distinguish periods of furniture.
109. To know the cause of warpage, shrinkage, and other defects of lumber.
110. To know how to rewick an oil stove.
111. To properly appreciate the services and products of electricians and the electrical industry.
112. To be able to repair broken furniture.
113. To know how to properly lay linoleum.
114. To be able to repair electric flatiron, toaster, etc.
115. To know how to fasten slides to furniture.
116. To be able to tie some of the common knots.
117. To know how to adjust valves and be able to repair a leaky float in flushing tank.
118. To know how to apply transfers and stencils.
119. To fill cracks in woodwork.
120. To understand the principle of the cooling system in an automobile.
121. To know the meaning and use of common terms found in electricity.
122. To be able to read a water meter.
123. To know how to wire a light socket.
124. To know what alloys do not rust.
125. To understand simple electric circuits.
126. To be able to put up a shelf, using brackets, strips of wood, or both, and know under what conditions to use each.
127. To know how to mend dishes, glassware, etc.
128. To know how to take care of a sag in a screen door.
129. To know the proper use of sandpaper.
130. To know the kinds of materials now used as substitutes for woods.
131. To know kinds and use of various glues.
132. To repair broken plaster.
133. To realize and understand some of the problems confronted by our transportation system because of the automobile.
134. To be able to remove wallpaper.
135. To know the nature, value, and extent of federal efforts toward forest preservation and reforestation.
136. To know how to make diagrams and charts.
137. To know how to wire an electric lamp.
138. To know the general principles of esthetic and structural design.
139. To replace a fuller ball in a faucet.
140. To know and understand how the automobile has brought about some of the social changes in our society.
141. To know the common kinds of glass in everyday use.
142. To know how to frame a picture.
143. To know how to use plastic wood.
144. To know the elementary principles of radio installation.
145. To know how to put in a gas mantel.
146. To know the periods of development in the evolution of the American home.
147. To know how to do freehand drawing.
148. To know the measuring units of electricity and how to use them.
149. To know how to connect dry cells.
150. To know the characteristics and be able to identify plain and quarter-sawed wood.
151. To know the value and importance of our industrial changes because of the automobile.
152. To know how to prepare and paint metal for etching.
153. To know how to make lettered posters.
154. To know how to do pictorial drawing.
155. To know the importance of forest in our early American history.
156. To know the events and milestones in the history and development of the electrical industry.

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# Craftwork in Industrial Arts


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*Work that interests and attracts boys both in and out of school.*

The writer has been interested in craftwork as a hobby for many years. This interest prompted him to offer a course in mixed crafts as an extracurricular club activity. A membership of approximately 20 was desired, but nearly 150 enrolled.

The first step was to purchase tools and equipment. The tools were housed in portable cases so that they could be used both in the regular high-school work and for summer-camp work as well.

It was found that frequently inexpensive methods and materials would do very well for some of the work. As an example, a rather high-priced leather finish was being used at the school, when the foreman of a large saddlery firm informed the writer that they used an inexpensive mixture of oxalic acid, and gum tragacanth dissolved in water for finishing russet leather. A trial showed that the weak acid in the mixture gave a slight color to the leather, the gum acts as a filler, and a beautiful finish was obtained when the leather was polished with a piece of wool after the mixture had

*A cabinet full of special stamping tools*

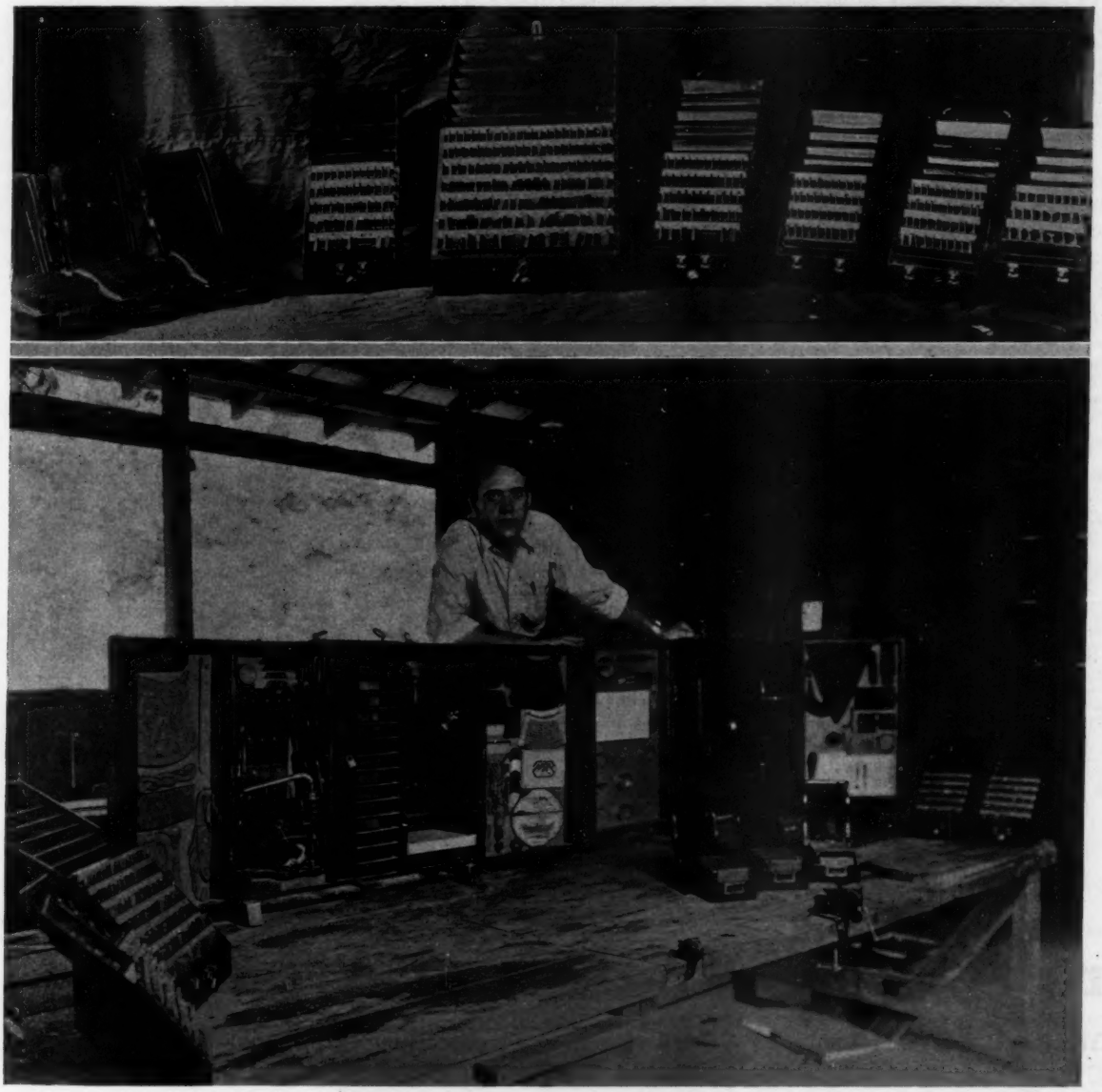
been allowed to dry. Many of the practical craftsmen are quite willing to impart practical hints of this type, when the teacher approaches them in the right way. The author also learned that all of the employees doing actual leather carving in this saddlery firm, were men past seventy years of age. Perhaps this craft as an industry is nearly passé, but there is much in the craft that should not be lost.

After the craftwork had been carried on as an extracurricular activity for about one and one-half years, the administration of the school decided to offer the work during the regular class hours and to give credit for it as for any other industrial-arts course. It was necessary to limit the work to senior-high-school students in order to keep the enrollment somewhere near the class quota. Included in the work offered are the following crafts: Navajo Indian silver; celluloid; leather carving; leather tooling and leather-thong work; tile bead, seed bead, and wood bead; wood carving and archery. The crafts are taught by groups and some students soon decide to spend most of their time within one group. This is discouraged only to the extent that the student must try each activity for a period long enough to permit him to make an intelligent choice.

The illustrations which accompany this article may give some idea of the extent of the work and the quality of the equipment that is needed. The tool kits, stamping tools, and devices, were all made by the writer. Each cabinet contains the tools, equipment, supplies and displays of finished articles from one craft activity. All tools are accessible and the kits are arranged in an orderly and helpful manner.

Naturally, there are many devices or jigs that might be made to assist in promoting the work. In archery, where a high degree of accuracy is desired, special tillering jigs have been devised. A simple yet efficient device for cresting arrows can be made with a sewing-machine motor and controls. Another simple yet very effective device is for winding bow strings. This can be made from an old model "T" steering-column top which has the three necessary gears for twisting uniformly the three sets of strands. Many other things can be made from waste materials some of which are also shown in accompanying photographs.

It requires a great deal of time to develop an activity program of this kind, but the work will be found very interesting and much worth while.



*Upper.: Different types of punches, dies, and stamping tools*
*Lower: Portable containers showing tools and samples of work*

# INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

## The Six-Year Educational Plan

On February 23, President Roosevelt presented to Congress the report of the Advisory Committee on Education.

According to this report, the committee recommends additional grants to the states amounting to a total of $855,500,000. These grants would start with $70,000,000 in the fiscal year 1939–40 and increase each year until in 1944–45 they would amount to $199,000,000.

Under existing grants, the various types of vocational education alone would receive $328,479,000 during the years from 1939 to 1945. These grants are all to be continued. The additional new grants would be distributed among general aid to elementary and secondary education, improved preparation of teachers, construction of school buildings to facilitate district reorganization, administration of state departments of education, adult education, and rural library service.

The recommendations specially emphasize the need for equalizing opportunities, and also suggest a thorough revision of the statutes covering existing grants to extend them over all desirable types of occupational training. The committee also voices the opinion that too much federal control is exercised over the funds set apart for vocational education, and suggests that authority be granted the several states to determine their vocational education needs.

State and federal departments of labor in conjunction with educational authorities are to work out safeguards to prevent the exploitation of vocational schools for private gain.

The new funds are to be divided in such a manner that the less wealthier states receive a proportionately larger share so that all the youth of America may have opportunities for adequate educational preparation for life.

Plans for the distribution of the money to the states, are to be jointly agreed upon between state departments of education and the U. S. Office of Education, although explicit recommendations are made to reserve the decisions as to what educational offerings are to be made, and how these are to be administered, to the individual state and local, urban and rural, educational administrators.

The advisory committee also recommends that the Civilian Conservation Corps, and the National Youth Administration, with its aid program to high-school and college students, be continued at least until 1945, and that this work be administered by a single nonmilitary federal agency to be inaugurated under the name of the National Youth Service Administration. Guidance, employment counseling, and apprentice training should be much enlarged in order to be of aid to all who need these services. To this end an occupational outlook service is to be established and carried on as part of the activity of the U. S. Bureau of Labor Statistics. In this way youth would be supplied with definite forecasts of the supply and demand of workers, which would aid them in arriving at a definite vocational choice.

All the foregoing provisions are to be applicable to the District of Columbia, Alaska, Hawaii, Puerto Rico, and other U. S. Possessions on the same bases as the states.

The Advisory Committee on Education, headed by Floyd W. Reeves of the University of Chicago, was appointed by President Roosevelt September 19, 1936. They spent more than a year of close study upon the work that had been assigned to them. Their findings and recommendations place a high value on vocational education, which, while gratifying, also places the possibilities of still greater effort and accomplishment definitely on the shoulders of all interested in this form of education.

## Co-operative Part-Time Courses

The advantages inherent in co-operative part-time courses are receiving more and more recognition. Adopted years ago by some schools offering trade training in the more common skilled trades and by engineering colleges, it is now gradually expanding into secondary schools offering training in the distributive occupations. It will no doubt be adopted eventually to train workers for other trades and occupations.

The chief value of this type of training lies in the fact that the student while receiving systematic school preparation, also comes into intimate contact with actual life and job experiences in the business or industrial world. In this way the span between school and job is most painlessly bridged and the vitalization of the educational processes are made correspondingly more easy and direct.

Another factor which makes this type of educational endeavor very valuable, is the intimate contact which it establishes between employer and school. This is especially important today when it is so necessary that educational advances keep abreast with those made by business and industry. At the same time if the employers and the school get together in working out the educational content for courses that are to be given to the young employers, both will feel a responsibility which hitherto has been carried almost entirely by the school alone. Criticism of school procedure, therefore, will fall away, and it will be easier to obtain the financial support needed to continue and further improve American educational standards.

There is still another factor to be considered, and that is the opportunity it affords both student and employer to study each other during this time of preparation for the future. Not infrequently students find permanent employment because their behavior and attitudes during their learning years have made a favorable impression on those who are now co-operating with the school in preparing our future business and industrial workers and leaders. In this way, the management of placement service now frequently offered by public-school systems becomes comparatively easy.

To make these co-operative courses truly successful, great care must be exercised in selecting the right kind of co-ordinators. These must possess judicial minds and great tact and diplomacy. They must be able to look at problems as they arise with unbiased eyes, avoiding overemphasizing either the school angle or the employer angle. They must ever be circumspect in what they say and do, because they are the liaison officers upon whom frequently depend the proper working of the entire scheme.

Co-operative part-time training has much in its favor. It deserves careful study by those interested in industrial arts and vocational education and it is to be hoped that it will receive a much wider adoption in the future.

# Bookbinding as an Industrial-Arts Subject


## Guy A. Pratt

*Washington High School,*
*East Chicago, Indiana*


*A clear and interesting exposition of this old handcraft.*

School administrators who are looking for new subjects with which to enrich their curriculums would do well to consider bookbinding. It is a subject that is easily adaptable on either the junior- or senior-high-school level, and can be carried on without a large outlay of capital.

That there is a rapidly growing demand for courses including bookbinding, has been shown by the number of teachers taking this work in summer- and evening-school classes within the past few years. A number of college summer sessions offer it as an undergraduate course, but it has not been commonly listed in high-school curriculums.

If properly taught, bookbinding promotes not only an appreciation of book construction, but also affords a fine course in handwork. In addition, there is an abundance of related-subject matter which may be incorporated to enhance the training received while taking the course. Appreciation of book construction alone would seem to justify the existence of bookbinding as a high-school subject since ruthless destruction of school and library books is so common among children. A great many adults, even, do not seem to know how to handle books properly so that their use and attractiveness may be prolonged. A greater respect for books is gained by a knowledge of their construction. This is shown by the fact that many students who have worked in the writer's classes have told him that now they invariably examine the type and quality of binding of every new book they see. They would under no circumstances turn in the corners of sheets or carelessly pencil pages.

Until about the middle of the last century, all bookbinding was done by hand, and there were many individuals who earned their living in the craft. With the advent of bookbinding machinery, the number of these fine old handbinders gradually diminished until handbinding is scarcely considered a trade. Indeed, these master bookbinders acquired an individual style comparable to that recognized in fine canvases and music today. A few of these talented craftsmen continued, thus preserving for the present generation an art that seems to be coming back into its own as an industrial-arts subject.

Although richly gold-tooled or jeweled books make attractive show objects, the writer is more interested in neat, sturdily bound books and magazine volumes which serve a practical purpose when they are completed. Every school has a library of some sort, the books of which need constant repair. This work can be done by the bookbinding class, thereby effecting quite a saving of funds, and the books can be returned to circulation in a short time. There are magazines, too, in the library and school shops that should be bound into volumes so that they may not be lost or destroyed. The pupils also can rebind or repair their own books so that younger members of the family may use them later on.

The question is often asked: "How much does it cost to bind a book?" This cannot be accurately answered because the wide range of mediums used may make the cost vary from a few cents up to a dollar or more. In schoolwork, especially in the lower grades and junior high school, scraps of cloth, cardboard window signs, flour paste, linen thread, and pen and ink, may be utilized to work wonders. Leather, imitation leather, buckram, and book cloth, can be procured at moderate prices from bookbinding supply houses. Binding board is carried in a variety of weights and sizes, and the cost of other items such as bookbinder's flexible glue, thread, end papers, etc., is relatively insignificant as a little goes a long way.

The greatest expense in initiating the course is the cost of the required equipment. But even this may be cut to a very small amount as practically all of the essential pieces may be made in the school shop at the cost of the necessary wood and hardware only. The four different pieces of equipment shown in the accompanying illustrations, together with a few hand tools, are all that are actually essential in the beginning, though it is quite likely that other items would be desired as the course progresses. The number of pupils in the class naturally governs the number of the items needed.

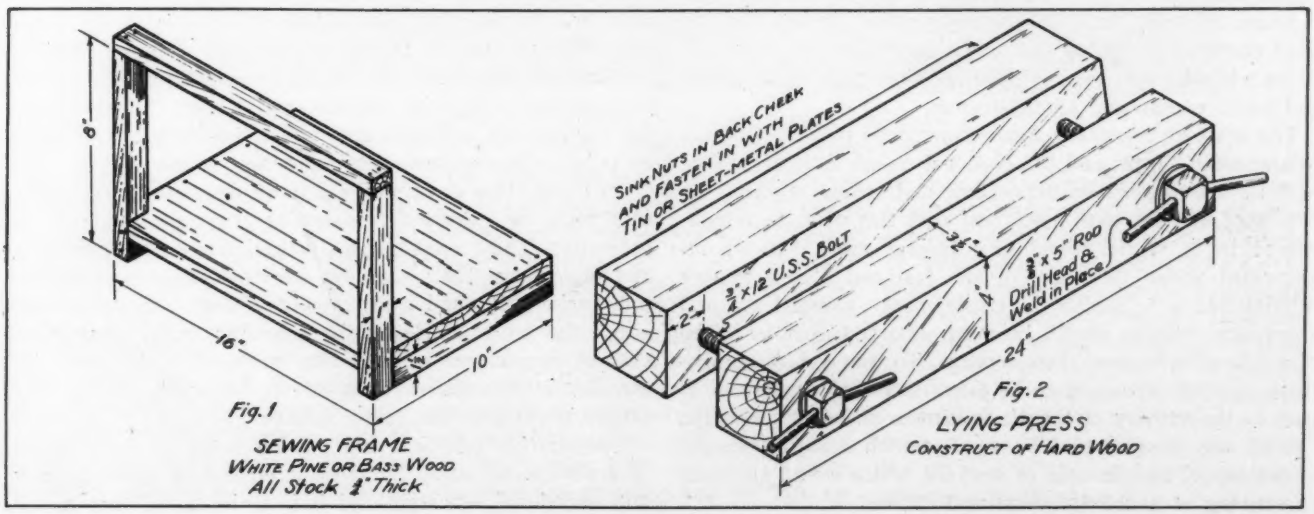
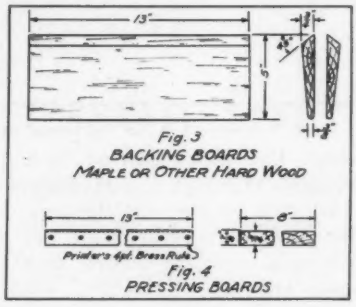



Fig. 1
SEWING FRAME
White Pine or Bass Wood
All Stock 1" Thick

Fig. 2
LYING PRESS
Construct of Hard Wood

For a class of fifteen pupils, it is recommended that the following equipment and tools be procured:

7 Sewing frames, Figure 1
3 Lying presses, Figure 2
3 Pairs of backing boards, Figure 3
3 Pairs of pressing boards, Figure 4
3 Cobbler's hammers with wide heads
3 Two-inch carpenter's chisels
6 Sloyd knives
2 Pairs of scissors, 8-in. blades
2 Back saws
6 Bone folders
3 Draftsman's triangles, 10 in. or bigger
1 Package of long slender needles
1 Paper cutter, 18 in. (not absolutely necessary)
6 Ordinary flat rules. A few lengths of printer's brass rule, or pieces of strap iron




The uses of materials such as glue, cloth, and the like, are explained in the following instructions on binding magines.

### Binding a Volume of Magazines

The procedure in binding magazines is first to arrange them in their proper order according to dates of issue. Next, remove the staples along the back with a small screw driver. Unless it is especially desired to retain the magazine covers, they should be removed from the body of the contents since to bind them in, tends to make the binding stiff and unnecessarily bulky.

For the sake of simplicity, let us assume that the magazines which are about to be bound are of the single-section type, that is, the sheets are placed together just as one would take several sheets of paper and fold them all together once. A single monthly issue will henceforth be referred to as a section.

From good, strong, white or monocolored paper, cut two sheets slightly longer than the magazine from head to tail (top edge to bottom edge) and slightly more than twice the width of the page (back to fore-edge). These papers are called the end sheets. Fold each sheet in the middle, and place one of the folded sheets on each side of the pile of magazines to be bound.

Jog the pile up evenly at the head and back and place between two boards with the back of the sections protruding about ¼ in. to allow room for sawing in. Clamp the whole in the lying press as shown in Figure. 5. Now measure off ¾ in. along the back, both from the head and the tail, and draw pencil lines squarely across it. See Figure 5. Divide the space between into three equal spaces and draw double lines ½ in. apart at each of the three marks. With a back saw, or coping saw, make kerfs through all eight of the pencil marks deep enough only to puncture the innermost folds of the sections. These kerfs produce holes through which the needle and thread are passed in sewing up, which is the next operation.

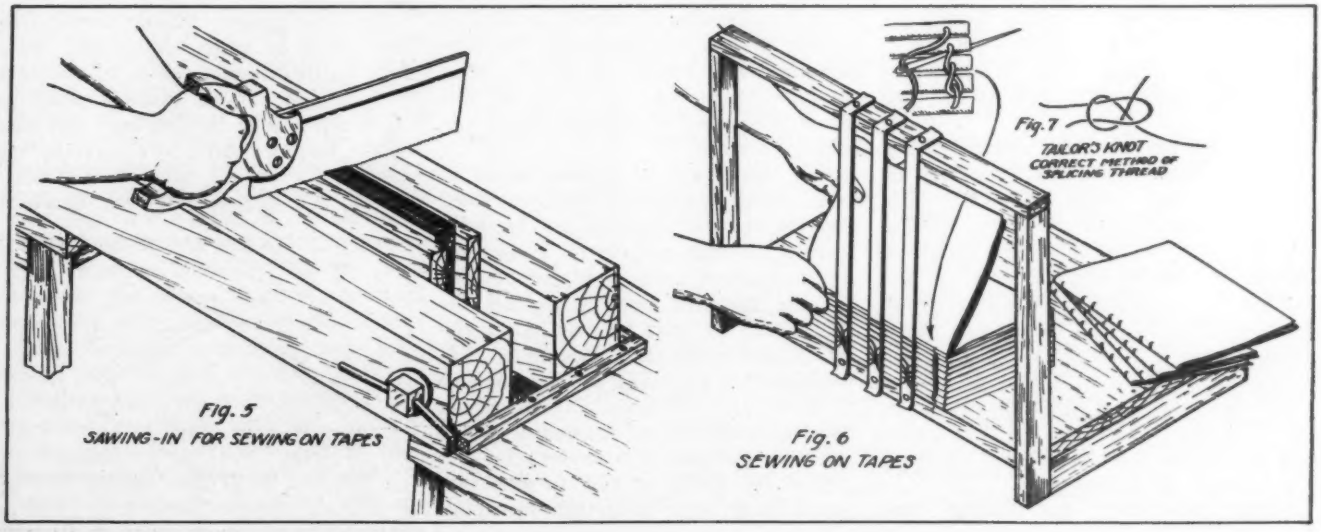
Remove the sections from the press and, using the top one turned upside down, as a guide, stretch three pieces of ½-in. cloth tape from the rail to the bed of the sewing frame. See Figure 6. Space the tapes so that they pass exactly between the double kerfs. The tapes may be fastened in place with large thumb tacks. With a long slender needle, threaded with about 5 ft. of linen thread, start the sewing by inserting the needle into the first hole on the right of the end sheet as it lies upside down on the sewing frame. Pass the needle along the inside of the fold and bring it out at the next hole; around the tape; in at the next hole; out at the next and so on, until it is finally brought out at the last hole on the left. Leave 3 or 4 in. of the thread protruding at the starting hole. Lay on, upside down, the first magazine section and insert the needle at the first left-hand hole. Proceed as before, and when the thread is brought out at the extreme right-hand hole, draw the two lengths tightly (always pull lengthwise and never out) and tie together.

Lay on each succeeding section in turn and continue as in the case of the first two except that from the third one on, the thread is anchored at the ends of the sections by passing it in and around the cross-thread in a sort of loop knot. This knot is called a kettle stitch. When five or six sections have been laid on, gather the threads passing around the tapes in a loop to keep the sewed-up sections compact. See Figure 6.

When a new length of thread is needed tie it onto the used-up piece with a "tailor's knot" as shown in Figure 7.

When the sewing is completed, cut the tapes so as to leave a length of 1½ in. on each side. Cut two more folds of end paper like the two sewed in with the sections and glue or paste these snugly inside the folds of the first ones by applying paste along the fold and about ¼ in. on each side of it. The outside end sheets are torn off just before the contents are incased in the cover.

After the second two folds of end sheets are pasted in, the entire backbone of the contents is coated with glue. It is preferable to use bookbinder's flexible glue in this case because it does not dry stiff or hard, though ordinary flour paste may be



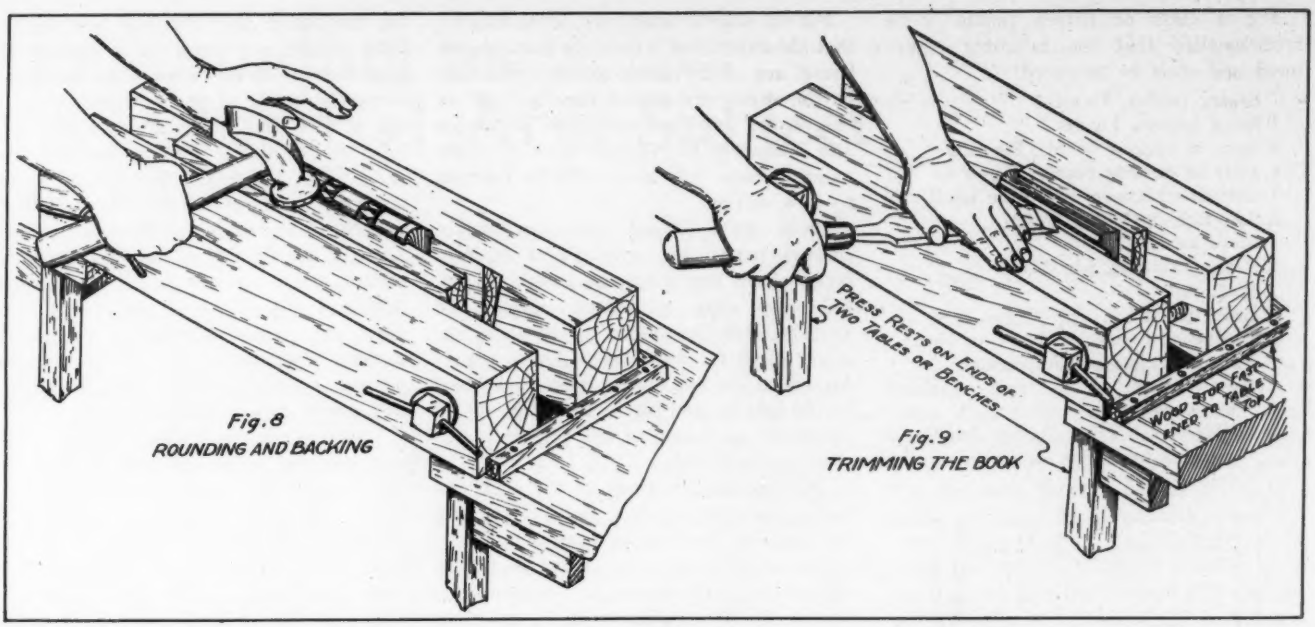



Fig. 8
ROUNDING AND BACKING

Fig. 9
TRIMMING THE BOOK

used but with less satisfactory results. After the backbone has been coated with glue or paste, slightly round it by pulling the outside sections toward the fore-edge, and then lay the contents aside until the adhesive has set beyond the tacky stage. When the glue has set sufficiently, further round the contents by pulling on the end sheets with the finger tips, pushing in the middle sections with the thumb, and at the same time tapping along the back edge with the backing hammer (cobbler's hammer). To further round the back and form the joints, place the contents between the backing boards, allowing 3/16 in. to protrude above the beveled edges. Squeeze up in the lying press and hammer with smart, glancing blows so that the outer sections will bend out and over the backing boards as shown in Figure 8. Examine a few books to get a thorough conception of how a neatly backed book appears. Back the book only enough to smoothly round it and to form the joints. Too much pounding is apt to cause the edges of the backing boards to cut through the end sheets.

The volume is then ready to be trimmed. Place a stiff board as large in area as the page, behind the volume with the joint overhanging one edge. With a draftsman's triangle, or a steel square as guide, draw a line along the head of the volume perpendicular to the joint and just far enough in to catch the shortest sheet. Place a piece of 3-ply wood or heavy cardboard on the front side of the volume with the upper edge just below the trimming mark. This thinner board is merely to protect the front joint while the work is squeezed up in the press.

Place the volume, still between these boards, in the lying press with the trimming line perfectly in line with the top edge of the forward press cheek. Tighten the press, and with a large, sharp carpenter's chisel proceed as follows: Rest the chisel flatly on the press cheek as shown in Figure 9, and with the palm of the left hand held at such an angle that only about a third of the chisel edge comes in contact with the paper, push the chisel forward the full width of the sheet, allowing only a few sheets to be cut at a time. Repeat stroke after stroke, until the head is completely trimmed. Trim the tail in the same fashion. Skill comes with practice.

Before trimming the fore-edge, flatten the backbone of the contents by holding it between the cutting boards and tapping it out with the hammer. This, it will be noted, causes the inner sections to be pushed out flush with the outside ones. After the fore-edge is trimmed, by slightly tapping it along the joints with the hammer, the round returns as before, pulling the inner sheets back and thus the concaved fore-edge, commonly noted on books, is formed.

Next, back the volume with flannel or super (cloth materials), which is glued over the round of the book and extended on each side to about 1½ in. These flaps are later glued inside the cover boards and are the main stays in holding the volume and its cover together. After gluing on the backing cloth, glue on an additional strip of soft paper just large enough to cover the backbone. Newspaper or toweling paper will do. The volume is then ready for the case or cover.

The description of how to make the case requires more time than the actual process. Cut two pieces of ⅛-in. stiff cardboard to a size, ¼ in. longer than the trimmed volume, and the same width from joint to fore-edge. This will allow for a ⅛-in. overhang on the three edges (head, tail, and fore-edge) when the boards are pulled out ⅛ in. from the joints to allow for the creased hinges. Cut the boards so that the grain in them runs parallel to the joint. This will cause them to warp away from the contents along the midsection rather than to turn up at the corners. The direction of the grain may be determined easily by testing which way the board bends the more easily.

Put the properly cut boards in place and secure with two heavy flat rubber bands running around from head to tail. Next comes the simple task of cutting, fitting, and gluing the cover material to the boards.

The cover material having been chosen, lay the book within the boards, down flatly on the material and at least an inch from adjacent edges. Make a pencil or chalk mark along the fore-edge and head of the bottom board. Now carefully roll the work over and make corresponding marks on the other side, as shown in

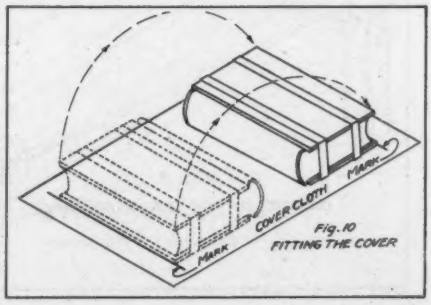



Fig. 10
FITTING THE COVER

Figure 10. Remove the boards now, and after coating the outer sides with glue, or paste, put them down on the material just as the guide marks direct. Turn the boards and material over and rub well with a clean cloth to remove all wrinkles and to insure adhesion at all points. Next trim the edges of the material so that they extend ¾ in. uniformly beyond the edges of the boards. Paste a strip of soft paper down the back between the boards, clearing them by 3/16 in. This is referred to as the back stiffener. Next coat the turn-in edges of the cover material with paste, and turn them in by starting with the corners. After turning in all four corners, turn in the four edges and rub them in and down securely with the bone folder.

Before the cover is pasted onto the contents, it should be allowed to season for a few hours, but in the meantime, the title, volume number, and year may be neatly lettered on small paper panels and glued to the back, and on the top cover board if desired.

When the cover has seasoned long enough for the paste to have dried thoroughly, it may be pasted onto the contents by the following method:

1. Place the contents accurately within the cover and check to see that all overhangs are uniform.
2. Carefully lay the book on one side and open back the top board.
3. Tear off the outside end sheet and coat the outside of the next sheet with rather thin paste. Be sure to paste down securely the ends of the tapes and the backing cloth flaps.
4. Pull the cover over into place and immediately turn the book over. If it seems that the overhang is not correct, proper adjustments must be made immediately.
5. Paste down the opposite cover in the same manner.
6. Run the edge of the bone folder along the hinge to slightly crease it. Place a sheet of waxed paper between the paste-down sheet and the sheet next to it so that they will not stick together.
7. Place the completed book between the pressing boards with the creasing strips exactly along the hinges, or directly between the joint of the contents and the back edges of the cover boards. Tighten up the press and allow the book to remain in it for a period of from eight to ten hours, after which it may be removed and put into use.

# Lesson for Young Workers—IV

## Thomas Diamond

*Vocational Education Department,*
*University of Michigan,*
*Ann Arbor, Michigan*

*The fourth of a series of suggestive lessons designed to help students of industrial arts and vocational education.*

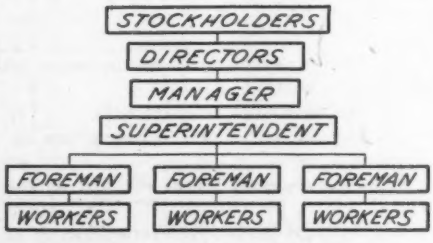
It was pointed out that the foreman has a boss. This boss is the superintendent. The man who hires the superintendent is the manager, and the manager is hired by the board of directors. This indicates that the foreman, the superintendent, and the manager are hired just as you are, and in many cases are just as likely to be fired as you are if they do not act in accordance with the rules laid down by those who are over them.

The next questions that arise are: Who hires the directors? and, How do they get their job? Before we can answer these questions, it may be advisable to start at the top of the chart and work down. The stockholders are at the top because they supply the money which enables the company to do business. Many of these stockholders are unable to spare the time to look after the spending of the money they have invested. So, in order that they may be sure that it is expended wisely, they elect to the board of directors such stockholders as they feel will take care of their interests. Naturally enough those who own the largest share of the stock will see to it that directors are elected with whom they are acquainted and upon whom they feel they can rely. They are able to do this because each share in the company carries one vote with it, and, as they own a majority of the shares, they can elect almost anyone they please.

After the directors are elected, they are responsible for determining the larger policies of the concern while the smaller affairs are left to the manager. As an illustration of this, we consider a case in which the expanding business of the concern indicates that an extension of the factory is desirable. This would be a clear case where the directors would be likely to act. Another illustration of this might be given regarding an automobile-manufacturing concern. This firm has been manufacturing a four-cylinder car, but, for certain reasons, it is felt that the introduction of a light six car would increase the popularity of their product. The manager could not decide this; it is a problem for the board of directors.

The manager is responsible to the board of directors and must carry out these policies in regard to the extension of the plant or the inclusion of a new design as soon as the directors have agreed upon them.

As soon as the manager finds out what the policies of the concern are going to be, he organizes his force and proceeds to put them into operation. He may not agree with the policy, and he may express his disapproval of it, but if his protests are disregarded he must push forward with it and give it his wholehearted support. This action of his is in keeping with the action that a football player would take if the coach decided that a certain play should be used. The player might not agree with the coach, and might be frank enough to tell him so, but once the particular play is decided upon, if he is the right kind of player, he will strive with all his might to make it a success.




*The diagram shown herewith was used in the previous lesson, but it is believed that something may be learned from it that was not taken up in that lesson*

If the manager manages the concern poorly, the company will lose money. As the stockholders are expecting a dividend from their investment, they will expect the directors to remove the inefficient manager and secure one who can produce a profit.

From this it will be seen that:

1. The stockholders provide the money with which business is carried on.
2. The stockholders elect the members of the board of directors.
3. Each share of stock carries with it one vote.
4. Therefore those who own most shares

are in a position to see that people are elected to the board of directors whom they can rely upon to look after their interests.

5. The directors determine the larger policies of the concern.

6. They are responsible also for seeing to it that the management is of a type that will be able to produce a profit.

7. The manager takes his orders from the directors.

8. If he is the right type of man he will devote all his thought and energy to carrying out the policies decided upon by the directors, even though in some cases he may not agree with them.

### Questions for Discussion

1. Is it necessary for the stockholders to come to work every day?

2. Do you believe it is just for a group of stockholders to elect the board of directors? Why?

3. How much has the owner of one share to do with the running of the concern? Is this condition fair to the small stockholder?

4. How much has one citizen of your town to do with the running of the affairs of the town?

# Testing and Tests

# Junior-High-School Woodworking Test

## H. L. Stiles

*High School,*
*Nogales, Arizona*

This is form B of this test. Form A was published on page 292 of the September, 1937, issue of this magazine.

Student's name.....
Grade.....
Age.....
Period.....
Date.....

Scores:
Part I: R-½W:.....
Part II: No. right:.....
Part III: No. right:.....
Total score:.....

### Part I — True-False Woodworking Test

INTRUCTIONS: TIME: 20 minutes

1. This test contains 50 true-false statements.
2. Read each statement carefully.
3. If you think the statement is true put a plus (+) at the end of the statement.
4. If you think the statement is false, put a zero (0) in the parenthesis at the end of the statement.
5. Study the samples carefully before beginning actual work.
6. Do not guess.

SAMPLE:

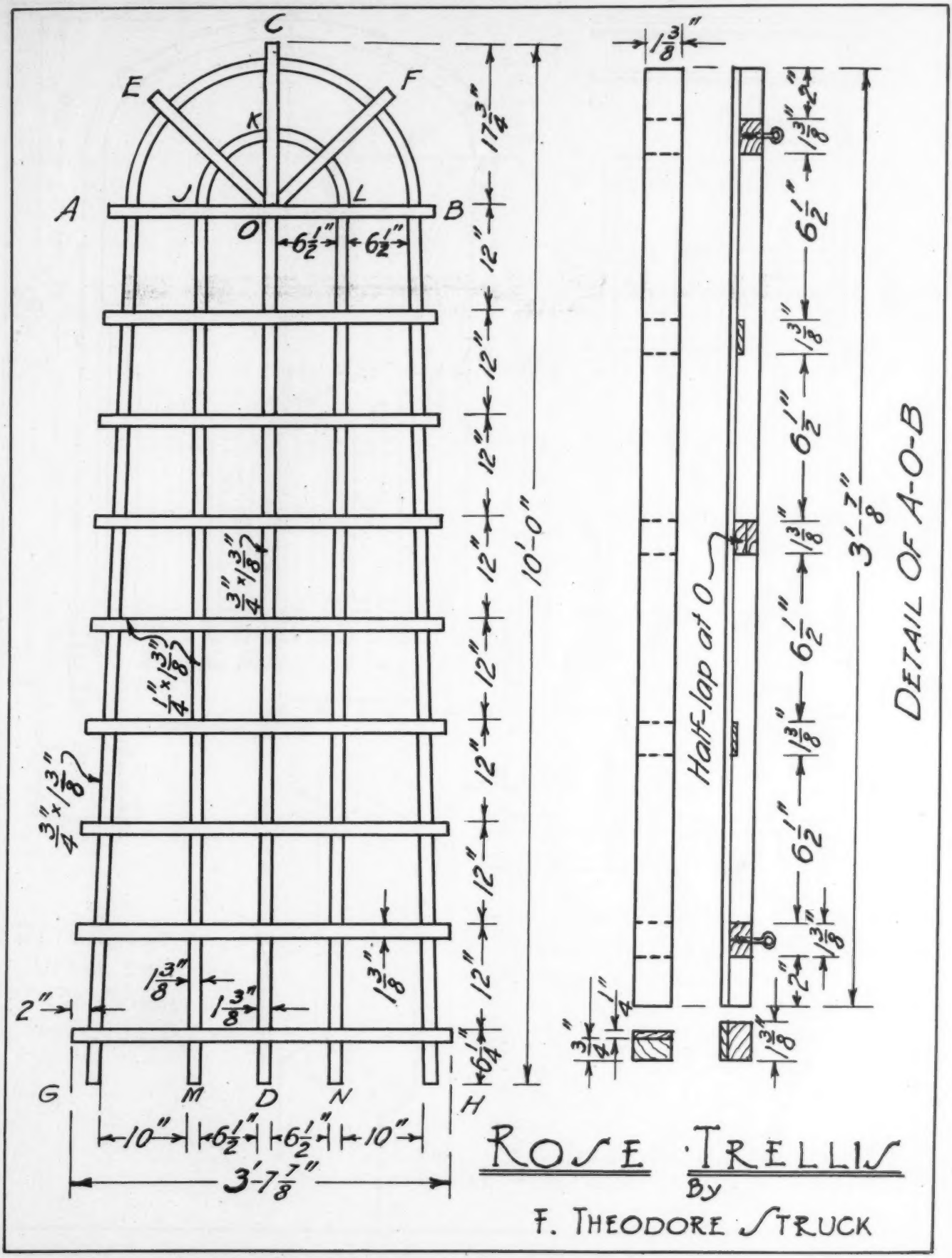
1. A hammer is used to drive nails. (true) (+)
2. Walnut is a soft wood. (false) (0)

TEST STATEMENTS:

1. The ripsaw is used for cutting across the grain. ( )0*
2. A screw driver is sharpened like a chisel. ( )0
3. A block plane is used for planing the end grain of a piece of wood. ( )+
4. Interior paints are thinned with alcohol. ( )0
5. Before marking with a marking gauge, the distance from the spur to the head should be tested with a ruler. ( )+
6. There are two adjustments for the blade of the jack plane. ( )+
7. Holes less than ¼ in. in diameter are usually drilled with a hand drill. ( )+
8. The point of the nail set should be smaller than the nail. ( )+
9. Soap is put on the threads of wood screws so that they will drive easier. ( )+
10. Paste wood filler is applied with a soft-bristle brush. ( )0
11. Thorough sanding is necessary when an old coat of paint is to be removed. ( )+
12. The hand scraper is used after the wood has been sandpapered. ( )0
13. The T-bevel differs from the try square in that it has a movable blade. ( )+
14. The cutting edge of the chisel should be at right angles to the side of the blade. ( )+
15. The jack plane is approximately 22 in. in length. ( )0
16. An auger bit with the figure 12 stamped on the shank will bore a hole 1 in. in diameter. ( )0
17. Auger bits are sharpened with a special file. ( )+
18. Varnish and paint brushes are cleaned with water. ( )0
19. Arrowheads are used to terminate dimension lines. ( )+
20. Varnish is applied over a filled surface. ( )+
21. Stain is used to bring out the beauty of the grain in wood. ( )+
22. The term f.h.b. refers to nails. ( )0
23. The nail set is used to countersink the heads of screws. ( )0
24. Common wood screws are sold by the pound. ( )0
25. Shellac is thinned with turpentine. ( )0
26. Paste filler is used to fill open-grained woods. ( )+
27. The sizes of saws are designated by the number of points to the inch. ( )+
28. Oil stains are hard to apply because they tend to raise the grain of the wood. ( )0
29. Paint is used to bring out the beauty of the grain. ( )0
30. Thick glue tends to make a joint hold better than thin glue. ( )0
31. In early days, nails that weighed 10 lbs. per thousand were referred to as 10-penny nails. ( )+
32. Linseed oil is used on oilstones to cleanse the pores of the stone. ( )0
33. The size of the chisel is indicated by the length of the blade. ( )0
34. Some boards are wider than they are long. ( )+
35. The teeth of a crosscut saw are chisel shaped. ( )0
36. The rule should be stood on its edge when laying out dimensions. ( )+
37. The heartwood of a tree is softer than the sapwood. ( )0
38. The medullary rays are seen as fine white radial lines on the end of a log. ( )+
39. The function of the heartwood is to protect the living tissues of a tree. ( )0
40. F. A. S. walnut is the best grade that can be purchased. ( )+
41. When a drawing is made to scale, the dimensions are also reduced. ( )0
42. A working drawing can be understood by technicians in all parts of the world regardless of language. ( )+
43. Gouges are beveled on either the inside or outside of the curve. ( )+
44. The arrises of the hand scraper are turned with the burnisher. ( )+
45. Paste filler is usually used when filling oak. ( )+
46. Dividers may be used for dividing a given space into a given number of parts. ( )+
47. The blind mortise-and-tenon joint is commonly used in table construction. ( )+
48. Flat paint contains more oil than gloss paint. ( )0
49. The warping of lumber is caused by the

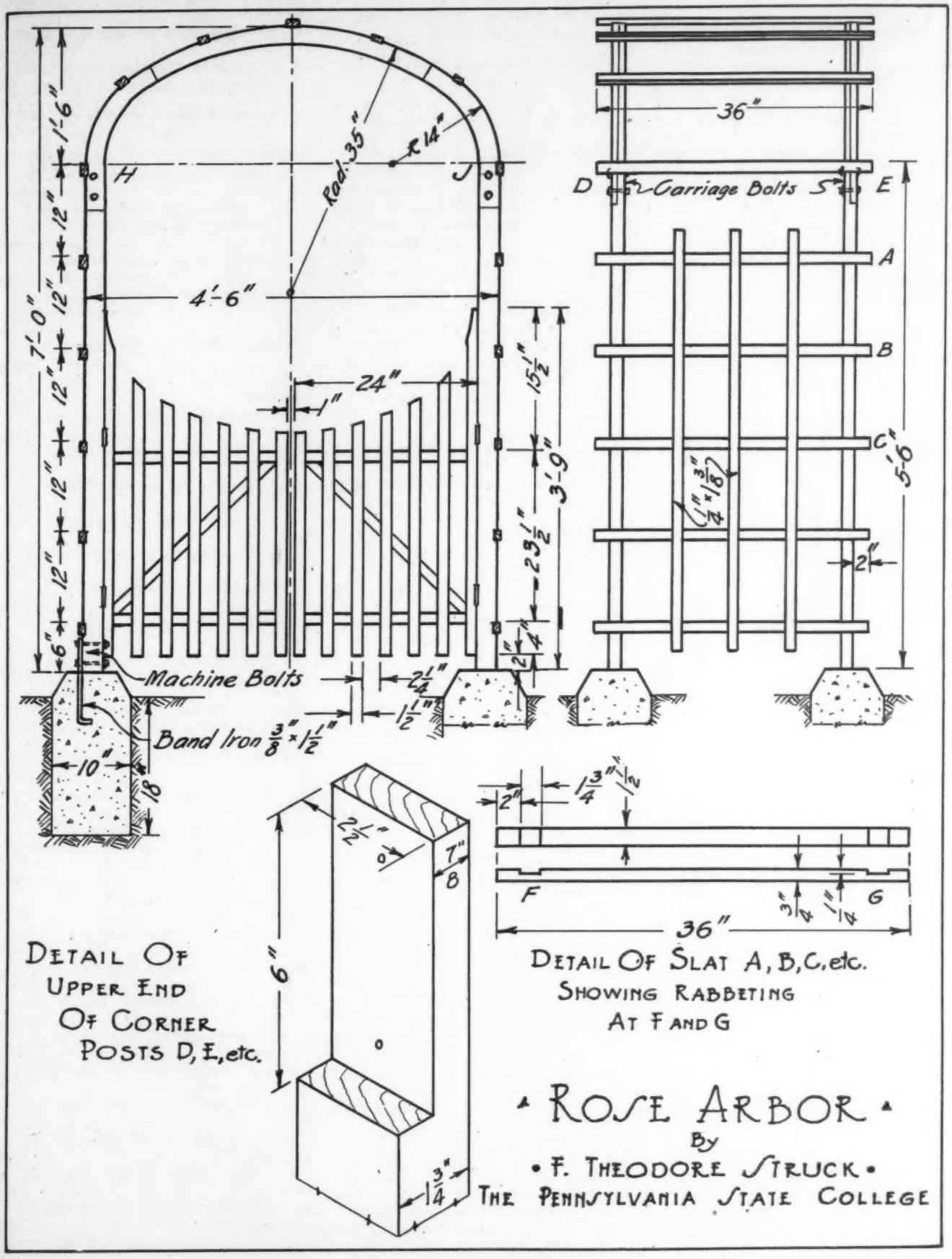
(Continued on page 159)

*The key letter or word appears at the right of each test question.




*Submitted by F. Theodore Struck, Head, Department of Industrial Education, Pennsylvania State College, State College, Pennsylvania*

*(See description on page 161)*




*Submitted by F. Theodore Struck, Head, Department of Industrial Education, Pennsylvania State College, State College, Pennsylvania*

*(See description on page 161)*

uneven shrinkage of moisture in the cell walls. ( )+

50. Molding is sold by the lineal foot. ( )+

*Score:* R-½W:.....

### Part II — Simple Recall Woodworking Test

INSTRUCTIONS: TIME: 15 minutes

1. This part contains 25 incomplete statements.
2. Read each statement carefully.
3. Decide which word would make the statement complete.
4. Write the word in the parentheses at the end of the statement.
5. Study the samples carefully before beginning actual work.

SAMPLE:

1. The hammer is used to drive (*nails*)

TEST STATEMENTS:

1. Screws are driven into wood with a (.....) *screw driver*
2. The standard unit for measuring lumber is the (.....) *foot*
3. Lumber is sold by the (.....) *board foot*
4. Wood screws are generally sold by the (.....) *gross or dozen*
5. Paint is usually applied with a (.....) *brush*
6. The T-bevel has a movable (.....) *blade*
7. The width of a board is always measured across the (.....) *grain*
8. The easiest stain to apply is dissolved in (.....) *water*
9. To obtain a smooth surface in wood finishing, the pores in the wood must be (.....) *filled*
10. When using the backsaw for cutting accurate work, the teeth should cut just by the (.....) *line*
11. Handsaws are sharpened with three-cornered (.....) *files*
12. Sandpaper is ordinarily sold by the (.....) *sheet*
13. The term "penny" in woodworking is designed by the letter (.....) *d*
14. Finishing nails are driven below the surface with a nail (.....) *set*
15. Shellac is soluble only in (.....) *alcohol*
16. When applying varnish, brush in the direction of the (.....) *grain*
17. Turpentine is used in paint as a thinner and as a (.....) *dryer*
18. Wood should not be sandpapered across the (.....) *grain*
19. The point of a marking gauge is called the (.....) *spur or pin*
20. Dowel pins are usually made of (.....) *birch*
21. Casein glue is made from (.....) *milk*
22. An angle of 90 deg. is called a (.....) *right angle*
23. Wood filler is usually thinned with (.....) *turpentine*
24. Varnish is usually thinned with (.....) *turpentine*
25. The cap iron of the plane blade helps to stiffen the (.....) *plane iron or blade*

*Score:* Number right:.....

### Part III — Woodworking Completion Test

INSTRUCTIONS:

1. Certain words have been left out of the sentences below.
2. Underlined spaces show where the words are left out.
3. You are to write, on the underlined spaces, the words which have been left out.
4. Study the samples carefully before beginning actual work.

SAMPLE:

1. Walnut is classed as a ..*hard*.. wood.

TEST STATEMENTS:

1. Prices on large quantities of lumber are quoted at so much per ..... by lumber companies. *thousand or M*
2. If the length is in feet, divided by ..... when figuring board foot. *12*
3. The growing part of the tree is called the ..... layer. *cambium*
4. The ..... of a marking gauge should be sharpened like a knife point. *spur or pin*
5. The ..... adjustment on the plane is used to regulate the depth of the cut. *Y*
6. The common types of handsaws are the ..... and the crosscut. *rip*
7. The ..... saw is used for cutting with the grain. *rip*
8. Saw ..... is the term applied to the groove made by the saw. *kerf*
9. The ..... drill is used to turn round-shank twist drills. *hand*
10. Sandpaper should not be used until all the ..... work has been completed. *tool*
11. The size of common nails vary from .....d to 60d. *2*
12. To make a stronger joint, the nails should be driven at an ..... if possible. *angle*
13. Mortises may be made by ..... and chiseling or by chiseling alone. *boring*
14. When laying out joints, the ..... should be used to make accurate lines. *knife*
15. Thick glue will not ..... into the wood far enough to make a strong joint. *penetrate*
16. The ..... plane is best for planing long boards. *jointer*
17. Enamel is composed of a pale ..... and a pigment. *varnish*
18. Paint and enamel cans should be kept ..... when not in use. *closed*
19. Stains and paints are both ..... agents. *coloring*
20. Shellac comes in two colors, ..... and white. *orange*
21. Turpentine is secured from long ..... pine. *leaf*
22. Oil varnish is composed of resinous gums dissolved in ..... oil and turpentine. *linseed*
23. A table top is fastened to the ..... of a table. *rails*
24. The ..... bit can be adjusted to bore various size holes. *expansive*
25. To avoid marring the wood, a ..... should be used when pounding. *mallet*

*Score:* Number right:.....

## WOODSHOP TEST

**W. G. Hjerstedt, Chicago, Illinois**

### General Directions

The aim of this examination is to give you an opportunity to show what you have learned from your study of cabinetmaking. It is not expected that you will be able to answer every question. Read the directions and every statement carefully and be sure you understand what you are to do before you begin. Use upper-case roman lettering exclusively.

### Specific Directions

The following statements are to be completed with a single word, phrase, or number in each blank. Your score for this part will be based on the number of blank spaces correctly filled. No penalty will be imposed for blank spaces incorrectly filled.

1. When varnish has become thick, we use ..... to thin it.
2. In planing the end of a board, we prevent the farther edge from splitting off by ..... it.
3. A try square is used to draw ..... lines with the working edge.
4. The small nails which are used in holding small and thin pieces of wood together are called .....
5. The fourth step to take in squaring up a board is to square up the .....
6. The ..... is used to saw a board with the grain.
7. We use a ..... to close up the pores of oak before applying a finishing coat.
8. The ..... is used in general to lay off lines along the grain, parallel to a given face or edge.
9. Shellac is made of ..... dissolved in .....
10. The number on auger bits indicates their diameter in .....
11. Surplus stain is removed with ..... .....
12. A ..... is used to sink the head of a screw below the surface of a piece of wood.
13. A ..... is used to see if the board is square.
14. Never pound a chisel with a ..... ..... but use a .....
15. The plane should always be left on its ..... when not in use.
16. In making a dowel point, insert a ..... ..... rod into the hole.
17. If we put ..... on a screw, it will go in easier.
18. It is harder to plane ..... the grain that ..... the grain.
19. When boring a hole, the bit is placed in a holder called a .....
20. The diameter of screws is designated by .....

### Key

| | |
|---|---|
| 1. Turpentine | 11. Waste |
| 2. Chamfering | 12. Countersink |
| 3. Perpendicular | 13. Try square |
| 4. Brads | 14. Hammer, mallet |
| 5. Opposite end | 15. Side |
| 6. Ripsaw | 16. Dowel |
| 7. Filler | 17. Soap |
| 8. Marking gauge | 18. Against, with |
| 9. Lac, alcohol | 19. Brace |
| 10. Sixteenths | 20. Numbers |

# Problems and Projects

# A Desk Set in Copper—VI


## Leon H. Baxter

*Association for Crippled and Disabled, Cleveland, Ohio*


*The sixth of a series on an interesting art-metal project.*

### The Pen Tray

The pen tray, while simple in appearance, brings in a new operation — that of raising the metal.

A piece of 3 by 11 in., 18-gauge copper is thoroughly annealed. Lay out the design and cut out the blank.

Draw lines parallel to the outer edges 1¼ in. from each end and ⅜ in. from the sides. Place a hardwood block, grain end upward, securely in a vise, and holding the metal in the left hand with the scribed line on the metal even with the edge of the wood, strike even blows with a ball-peen hammer a bit away from the line all the way around the outline. See illustration at A, Plate 7. Repeat the hammering operation a little nearer the line and continue until a clear-cut edge is obtained all around the line. If not deep enough, continue hammering further away from the line toward the center of the tray until a depression of uniform depth and curve of edge is obtained. It may be necessary to anneal the work several times during the raising process and the tray may bend and buckle in a discouraging manner, but it can be easily flattened out by pounding with a fiber mallet as shown in Plate 7. File the edges straight and true, and planish all the upper surface both along the edges and over the bottom of the depression, as shown at B, Plate 7.

The design of the deer is cut out of 20-gauge brass as described for the other pieces of the set.

File, finish, and solder to the ends as indicated.

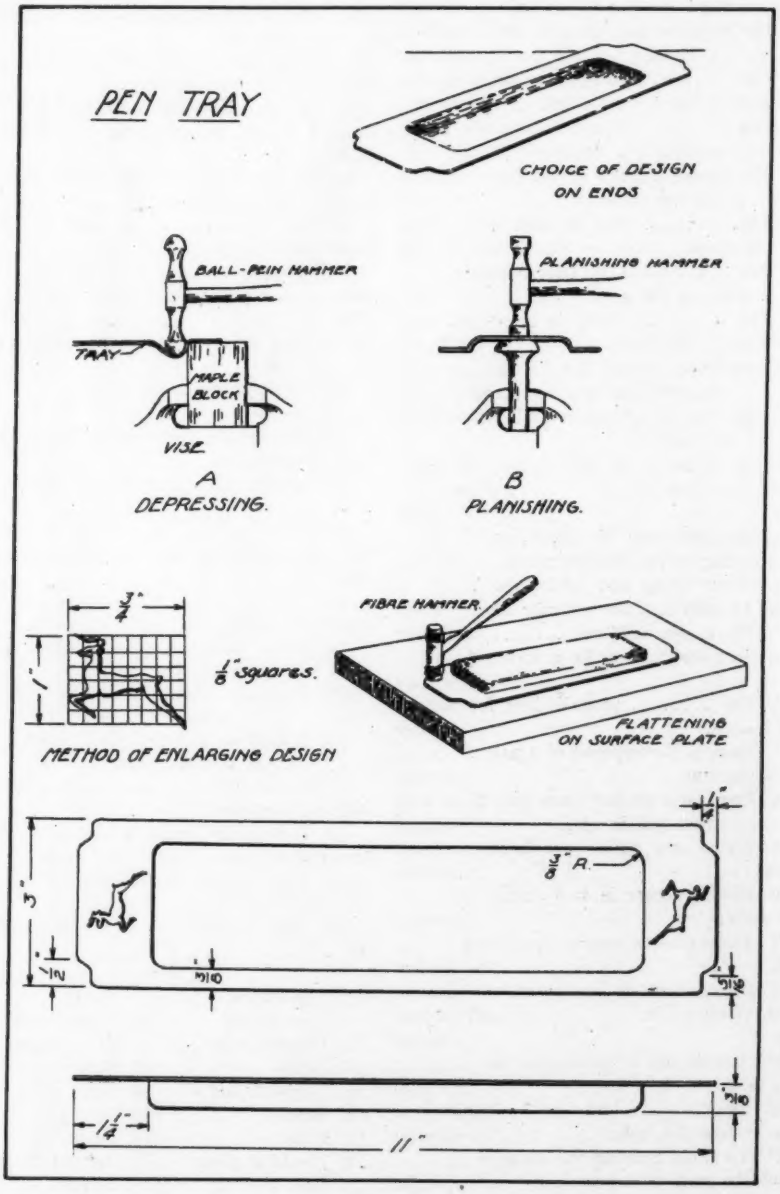



*Plate 7*

### CLASSIFYING THE PRINTSHOP STUDENTS


**L. L. Ingraham, High School, Santa Barbara, California**


The same qualities that make a person a desirable printshop employee, make him a desirable printshop student. The good employee is prompt and regular in attendance. He has the knack of making himself useful. He makes himself familiar with the "run of the shop" so he has a good idea how things should go. Accordingly, he fits into the shop's program of work. He is attentive and observing so that he requires a minimum of instruction and telling. He has initiative and takes pride in doing work in a workmanlike manner.

**Printshop Students Are Graded in Four Groups as Follows**

**A** Is prompt and regular in attendance. Has initiative — his "self-starter" is working all the time.
Is attentive and observing.
Makes himself familiar with the "run of the shop," so that he can always find a way to make himself useful.
Requires a minimum of instruction and telling.
Is rarely at a loss for something to do and goes about his work in a workmanlike manner.
Is game to tackle any job that may come his way.

Is quiet and orderly in the shop.

**B** Is prompt and regular in attendance.
Has a "self-starter" that is often weak and is sometimes not working at all.
Takes little or no pains to learn the "run of the shop," so he requires a good deal of instruction when he has to try out at something new.
Likes to pick the work that he is to do, and prefers to do only jobs for himself.
Fits in the shop program rather poorly unless he is "herded in."
May not always be quiet and orderly.

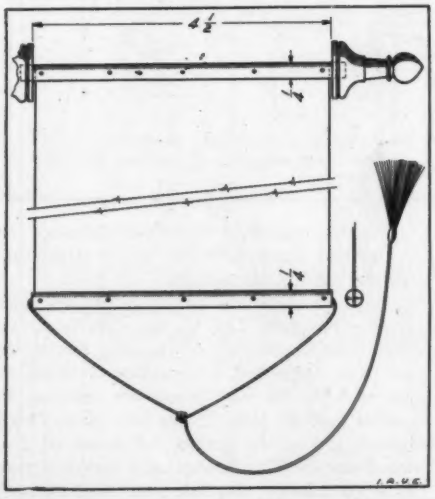
**C** Is the common, ordinary student.
Has an attendance record that is only good or fair.
Lacks interest in the program of the shop and prefers to do only a little easy work occasionally.
Does not fit into the shop program.
Has a "self-starter" that works only when he wants to do something for himself.
Spends his time when not watched, talking, playing about, or idling.
Is usually loud and noisy.

**D** Little may be said for him.
Is likely to be careless in attendance.
Has little or no interest in the work of the shop.
May try his hand at something easy just to make a showing.
Likes to spend his time talking, and is likely to talk much more than he studies. In fact, he makes himself a nuisance to those who wish to study.
Spends his time playing and loafing when not watched.
May be too lazy even to be noisy, but he is careless about his conduct as about everything else.
Is a misfit in the shop and is likely to prove one on any real job, unless he "takes a tumble to himself."

## MAKING A MODEL SCROLL FOR THE PRINTSHOP

**Robert Welden, Oswego State Normal School, Oswego, New York**

Mr. J. D. Rudolph, the printing instructor, at the Oswego State Normal School, encourages his students to experiment and explore fields related to printing, such as rubber-stamp making, bookbinding, linoleum-block cutting and other similar activities. The scroll described herewith is a result of this type of experimenting. It may prove of interest in other school printshops.




*A scroll that may find many uses*

After setting up an interesting piece of manuscript, it was printed on a piece of heavy parchment paper. This paper was used because it resembles the parchment used for early manuscript rolls. The ends of the paper were then secured between two pieces of ¼-in. dowel, cut through the center so that the two halves could be tacked together after the text had been placed between them. The ends are gouged out slightly so that after the cord is tacked in, the dowel will be approximately round. Chess pieces were glued in place on the ends of the upper dowel rod. These ends might, of course, have been turned in the woodworking department. The parchment in time becomes sufficiently shaped, so that it will practically rewind itself.

These scrolls may be used as party favors, menu cards, program cards, or as major athletic awards, or for other similar uses.

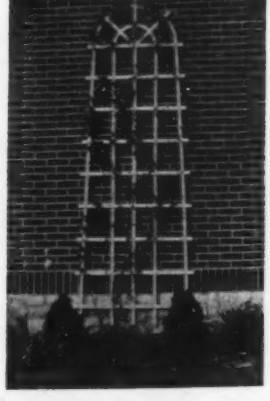
## ROSE TRELLIS AND ROSE ARBOR

**F. Theodore Struck, Head, Department of Industrial Education, Pennsylvania State College, State College, Pennsylvania**

### Rose Trellis

(See illustration on page 155)

There are many obvious reasons why young people as well as older ones should be encouraged to beautify their homes and gardens. With regular working hours relatively short, the matter of the proper use of leisure time is a matter of considerable consequence. Of course, there are many ways in which such leisure may be spent to advantage. Among them is creative handwork. Then, too, there are many persons who could find rest from weary nerves or find a renewed source of confidence in themselves — in their ability to do things — after or during long protracted unemployment or business reversals. It costs very little for materials and tools to make articles or objects that are worth much when measured in terms of the real, life-giving and abiding values of life. It is the purpose of this article to make a few suggestions that relate to making a trellis and an arbor for a rose or other climbing plant.



*Rose trellis*

*Material.* The material to be used should be governed by local conditions, the funds available and the setting or surroundings. Fitness to purpose is essential. In some locations a rose trellis made of rustic material (natural growth saplings) would be beautiful; in others, rough-sawed lumber stained a nut brown or a green would look well, while in still other instances, the lumber should be surfaced and painted to match the trim on the house.

It is desirable to use lumber that stands up well under adverse weather conditions. White pine, western red cedar, and redwood are but a few of the varieties that will give satisfaction. The relative price of the material locally is a governing factor with many. Money also may be saved by using stock-sized material.

*Construction.* The rose trellis described and illustrated in this article was designed to combine adequate strength with lightness and cheapness. The trellis was purposely kept light in weight because it was made to hang on the side of the house from shoulder hooks. This makes it easy to take down and replace when repainting is desired. For strength, the trellis depends chiefly upon two pieces of ¾ by 1⅜-in. lumber (the pieces *C O D* and *A O B*) which are joined by a half lap at O. The outer uprights or lengthwise pieces *A G* and *B H* are likewise of the same cross section, but the two uprights, one to the left and the other to the right of the center piece *C D* are made of lattice stock ¼ by 1⅜ in. in section.

Four segments, *A C*, *C B*, *J K*, and *K L* are sawed from ¾-in. stock having a "face" or width of 1⅜ in. A very satisfactory way of getting these right is to lay out the semicircular top part *A C B*, full size on a piece of paper. Ordinary wrapping paper will serve the purpose though a heavier paper would be better. Use a piece of lattice with a nail at *O* to strike the arcs. The lines *O E* and *O F* are at 45 deg. to the base line *A B*. The slats *O E* and *O F* may be housed into the circular segments or they may be nailed over them. The writer prefers the former method as that will keep them in the same plane with the piece *O C*. Light, flat-headed nails are used to fasten the slats to the uprights. Two screw eyes on the back side of *A B* are placed for the shoulder hooks which go on the side of the house. The trellis is kept in position at the base by a stake which is driven in the ground. After the rose has grown a year or two, no stake will be needed.

*Varying the Design.* The size and proportions of the trellis may be altered to suit requirements. Some will prefer to space the pieces *J M* and *L N* so that they will be equally distant from the center and the outside uprights instead of having them parallel to the center as shown in this design. Other modifications will occur to creative workers. In design, keep in mind the following four objectives: interest, harmony, restraint, and utility.

### Rose Arbor

(See illustration on page 157)

*Constructing the Arch.* This arbor has been designed with a colonial, three-center arch. For those who may prefer a semicircular arch, it is suggested that the total height of the arbor be kept at about seven feet. The upright corner posts which are 66 in. long in this project could be made 9 in. shorter if a semicircular arch is employed instead of the three-center colonial one. In either case the arch or top of the arbor is best laid out full size on paper. Each arch is built up of two layers of segments of material ⅞ in. thick and 2½ in. wide. The pieces should be so arranged that they break joints. Nail them firmly together. If waterproof glue is available, it is recommended that the segments be glued as well as nailed together. Arches built up in this way are stronger and hence superior to those cut

*Rose arbor*

from solid stock without overlapping joints. With the paper pattern as a guide, the joints in the built of arch may be placed wherever convenient. The writer used four segments on the one side and five on the other of each of the two arches. In other words, each arch was made up of nine segments so arranged as to break joints well and with the grain of the wood running in ways that give the maximum strength. It is to be remembered that one side of each of the two arches must be 6 in. longer than the distance shown in the front view above the center line *H J*, in order to overlap the corner posts. The latter are cut as shown in the detail. The total thickness of the built-up arch should equal the thickness of the corner posts, that is 1¾ in.

*The Gate.* The curve or arc at the top of the gate is a duplicate of the one spanning the arbor. The pickets or upright slats can be sawed to approximate length, nailed in place and then the top curve can be marked off with the aid of the pattern previously used for the top.

Children are inclined to push against arbor gates and perhaps break them at the hinges. To overcome this, the two gates are hung with double-acting spring hinges which permit the doors to swing readily in either direction. A space of one inch is left between the doors in order to give ample clearance even if the arbor should settle unequally on its foundation.

*Footings.* The drawing shows concrete footings 10 in. square and extending 18 in. below grade. If these should be too expensive (they are cheapest in the end) good-sized posts may be set in the ground to take their place. In either case it is suggested that good anchorage be provided. An arbor covered with vines offers considerable exposure to the wind.

*Slats.* Partly for the sake of appearance and in part to give the relatively frail framework added strength, each of the seventeen cross slats are rabbeted out one fourth of an inch as shown in the detail drawing and as is indicated in the front view of the arbor.

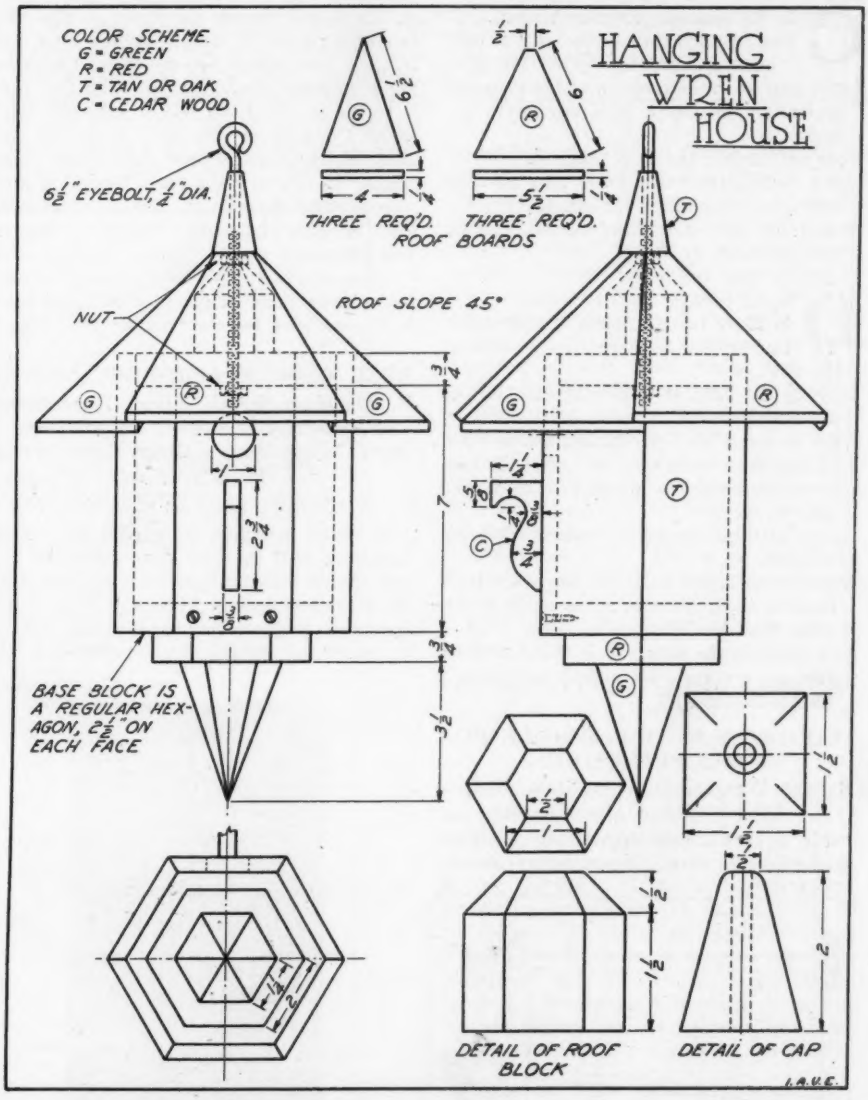
*Bill of Material.* The bills of material for both of the projects described in this article, have been purposely omitted. Pupils mature enough to undertake such a project should be able to make out their own list from the dawing. They should be encouraged to do this and to estimate the cost.

### HANGING WREN HOUSE

**Earl W. Boyer, Williamson School, Williamson, Pennsylvania**

Here is a hanging type wren house which has not failed to attract its tenant in each of the five summers that it has been swinging in the breeze.

The house is not difficult to make and, painted as shown by the color scheme on the




illustration, makes an attractive ornament for the garden which does not fail to attract attention and excite comment.

The base block and ceiling blocks are each regular hexagons 2½ in. on each face. To these two blocks five of the side pieces are cut to fit and nailed. The sixth or front side is put on after the roof boards are fastened on and is held in place at the top by the roof boards and at the bottom by means of two wood screws. This arrangement makes it possible to remove the front for cleaning purposes by merely removing the two wood screws.

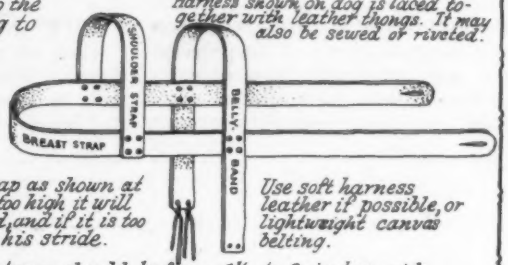
# DOG HARNESSES

W. BEN. HUNT, HALES CORNERS, WIS.

Any of the larger sized dogs can be trained to haul a sled, a cart or a travois, or to carry a pack; and if he is not overloaded, he will enjoy a hike with his master in spite of the fact that he is harnessed. But care should be taken not to overload him. Give him a load he can pull easily and help him pull when the going is tough

Fit the harness to the dog — not the dog to the harness.

Harness shown on dog is laced together with leather thongs. It may also be sewed or riveted.




Bellyband should not be too tight.

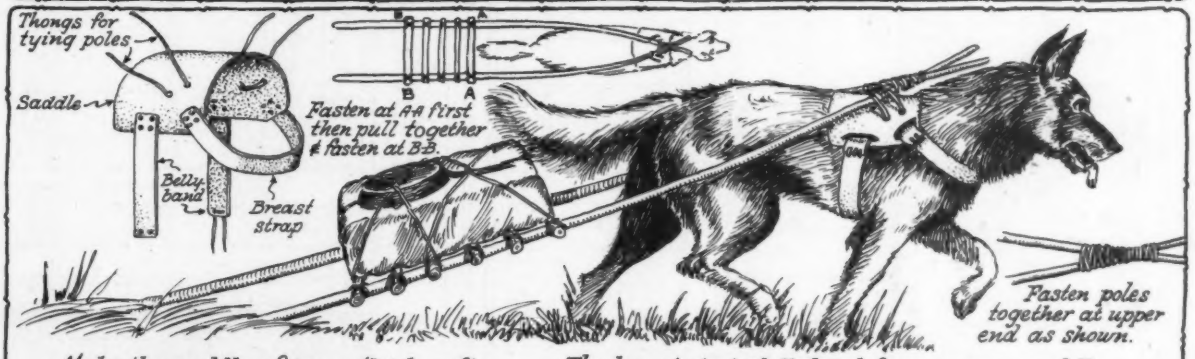
Can be fastened with thongs or with buckle.

Place breast strap as shown at left. If placed too high it will cut off his wind, and if it is too low it hinders his stride.

Use soft harness leather if possible, or lightweight canvas belting.

Harness straps should be from 1½ to 2 inches wide depending on the size of the dog.

HARNESS FOR SLED OR TOBOGGAN

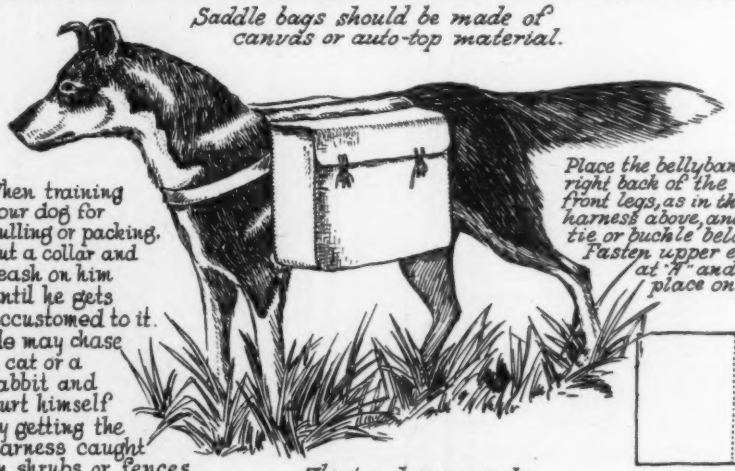

Thongs for tying poles
Saddle
Belly band
Breast strap
B B A A
Fasten at AA first then pull together & fasten at BB.
Fasten poles together at upper end as shown.

Make the saddle of some thick, soft leather or of 2 or 3 pieces of canvas sewed together and bound on the outer edge.

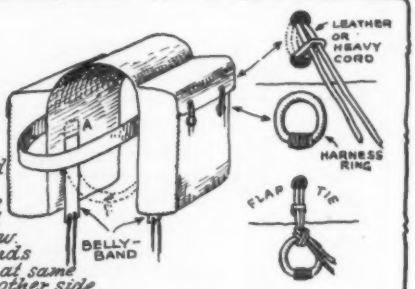
The breast strap & belly band for a canvas saddle should be sewed or riveted on. With a leather saddle they may be fastened thru slits as shown above.

HARNESS FOR DRAG OR TRAVOIS

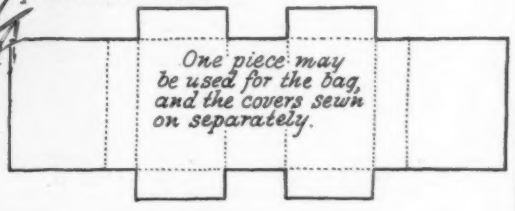
Saddle bags should be made of canvas or auto-top material.



When training your dog for pulling or packing, put a collar and leash on him until he gets accustomed to it. He may chase a cat or a rabbit and hurt himself by getting the harness caught on shrubs or fences.




Place the bellyband right back of the front legs, as in the harness above, and tie or buckle below. Fasten upper ends at "A" and at same place on other side.




The two bags may be made separately and the piece that goes across the back sewn on last

SADDLE BAGS

The roof block, which forms a flat space for nailing on the roof boards, is nailed to the ceiling block and the eyebolt inserted and securely fastened with two nuts. The cap piece must be slipped on the bolt before the latter is inserted in the blocks and before the nuts are fastened in place.

The pyramid and hexagon-shaped piece at the bottom should be nailed to the base block before the sides are put on.

## DOG HARNESSES

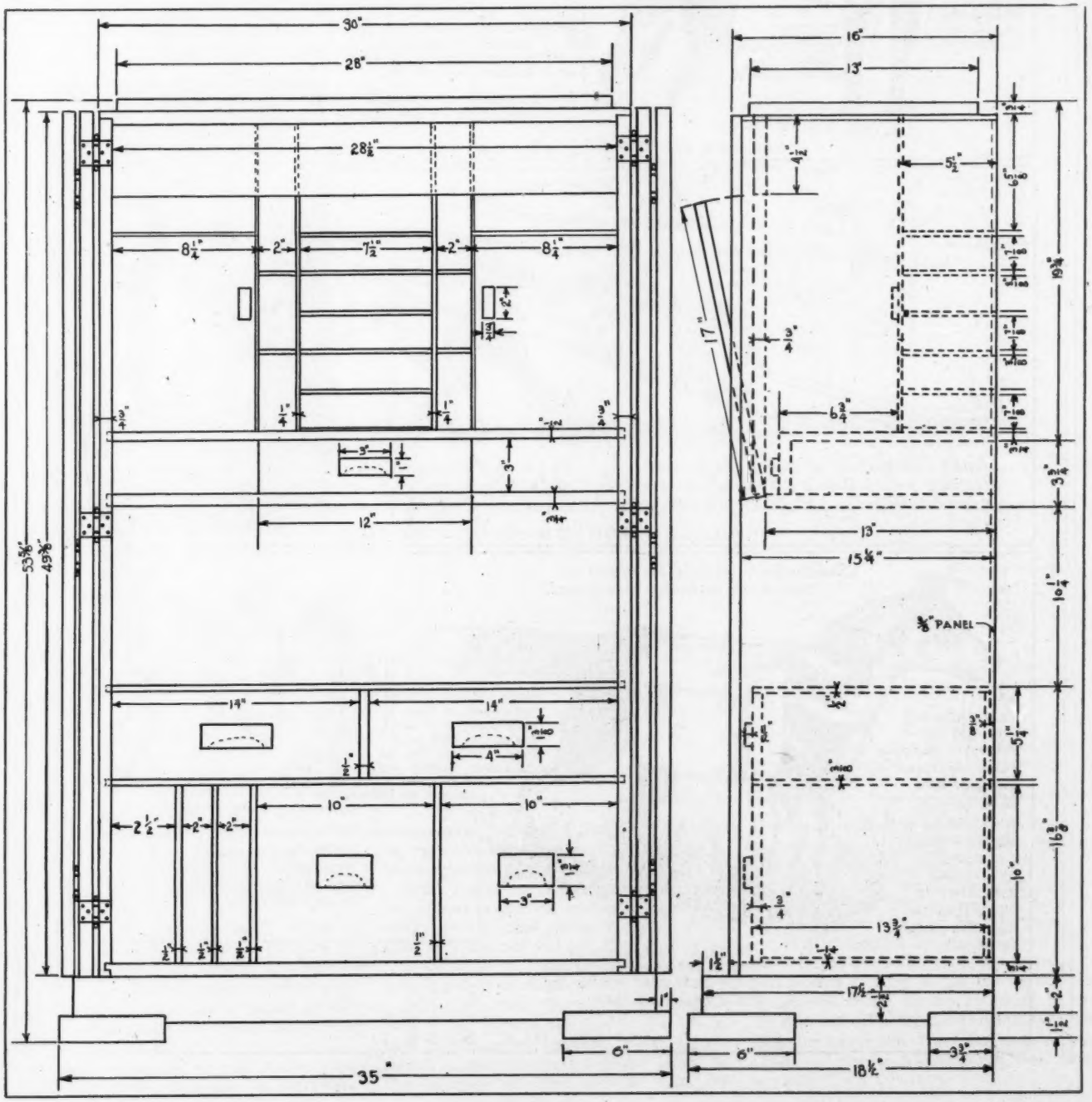
**W. Ben. Hunt, Hales Corners, Wisconsin**

The dog harnesses shown on the plate appearing on page 163 are the ones commonly used. If, however, one should wish to use a dog for pulling a cart or wagon, two things must be made. The first is a pair of loops, one on each side of the bellyband where it crosses the traces. These loops should be only large enough to fit the shafts of the vehicle. Then there should be longer traces and a method of fastening them to the whiffle tree. The latter may usually be done by cutting a slot in the trace as shown in the upper sketch on the plate of dog harnesses.

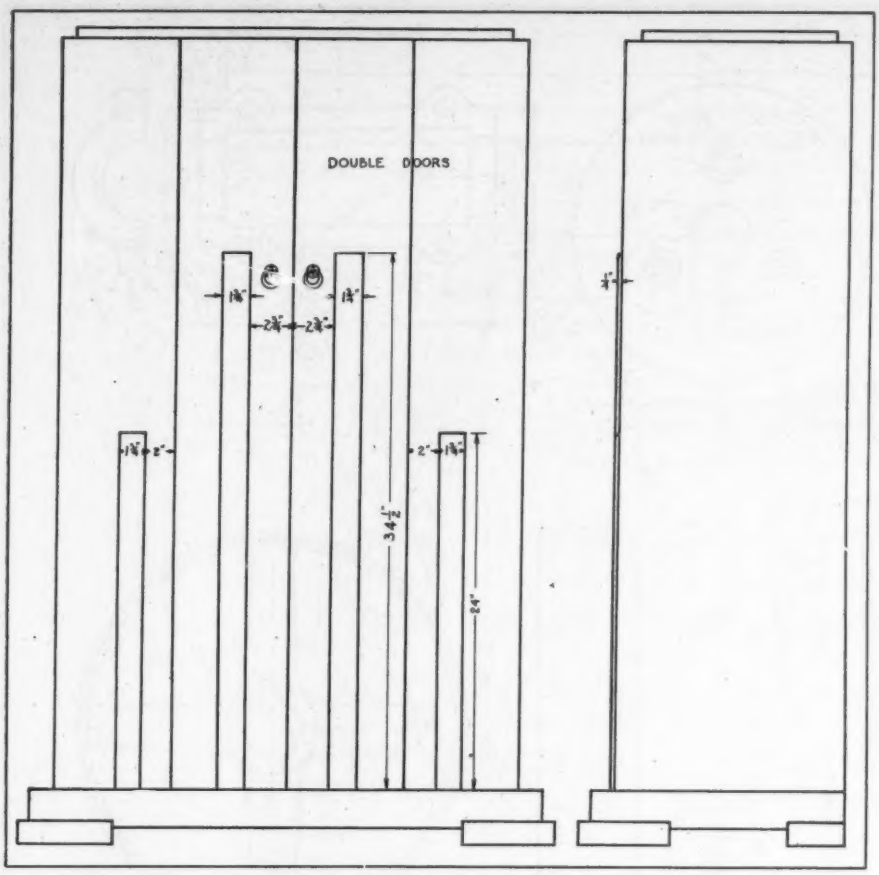
## THE GOLDBEATER

**Arthur Gage, Brooklyn, New York**

There are approximately 800 goldbeaters in America. This ancient trade is carried on exactly as it was in the middle ages — by hand and hammer. The iron hammer has a broad flat surface and weighs 10 lb. Imagine, if you can, a thin sheet of yellow gold only three millionths of an inch thick. The sheets are hand hammered from a solid nugget of gold, and are beaten out so thin that if one were to roll a sheet between his hands it would vanish. All through the centuries, no invention to beat gold leaf has ever been substituted for the hand-and-hammer method. It seems unbelievable that these goldbeaters can feel with their hammers the thinness to which the sheet has been reduced. This craftsmen's feel cannot be duplicated by the machine. The mold used in this process is made from cow gut. It is obtained from an English firm and costs $110 each. With good care, it will last 20 years. The mold rests upon a block of granite, which




*A modern desk*




*Desk with doors closed*

*Modern desk as it looks when closed and when open*

in turn rests upon soft sand. This softens the blow of the hammer. Goldbeaters must be careful to preserve the required delicacy of touch, hence they may not allow callouses to form on the palms of their hands.

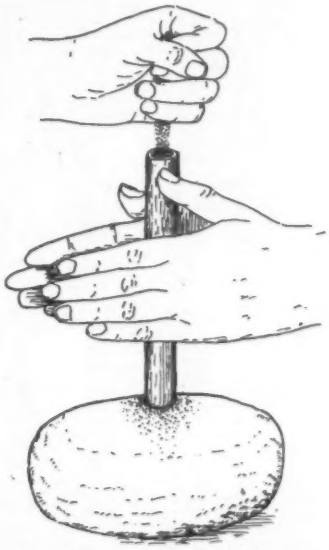
## MODERN DESK

**R. E. Cote, Boys' Technical High, Milwaukee, Wisconsin**

Due to the limited area of apartments, it is often necessary to eliminate pieces of furniture however desirable they may be. To overcome this elimination process, this modern desk was designed. It is really several pieces in one. It serves as a writing desk, filing cabinet, typewriter table, and telephone stand. The typewriter swings out into position on a metal arm. The telephone is placed above near the pigeonholes, with the wires leading in from the rear. The wooden piece at the top conceals a desk light which lights automatically upon the opening of the desk shelf. The wood is gum with mahogany trim. The finish is natural rubbed down.

The desk was designed in the furniture-design class, and was constructed by a student in the trade woodshop under the leadership of Mr. Luebs of Boys' Technical High School, Milwaukee, Wis.

## HISTORY OF OUR TOOLS



*Primitive men drilled stone with sand and a hollow reed as we now drill glass with emery and a brass tube.* E.M. Wyatt

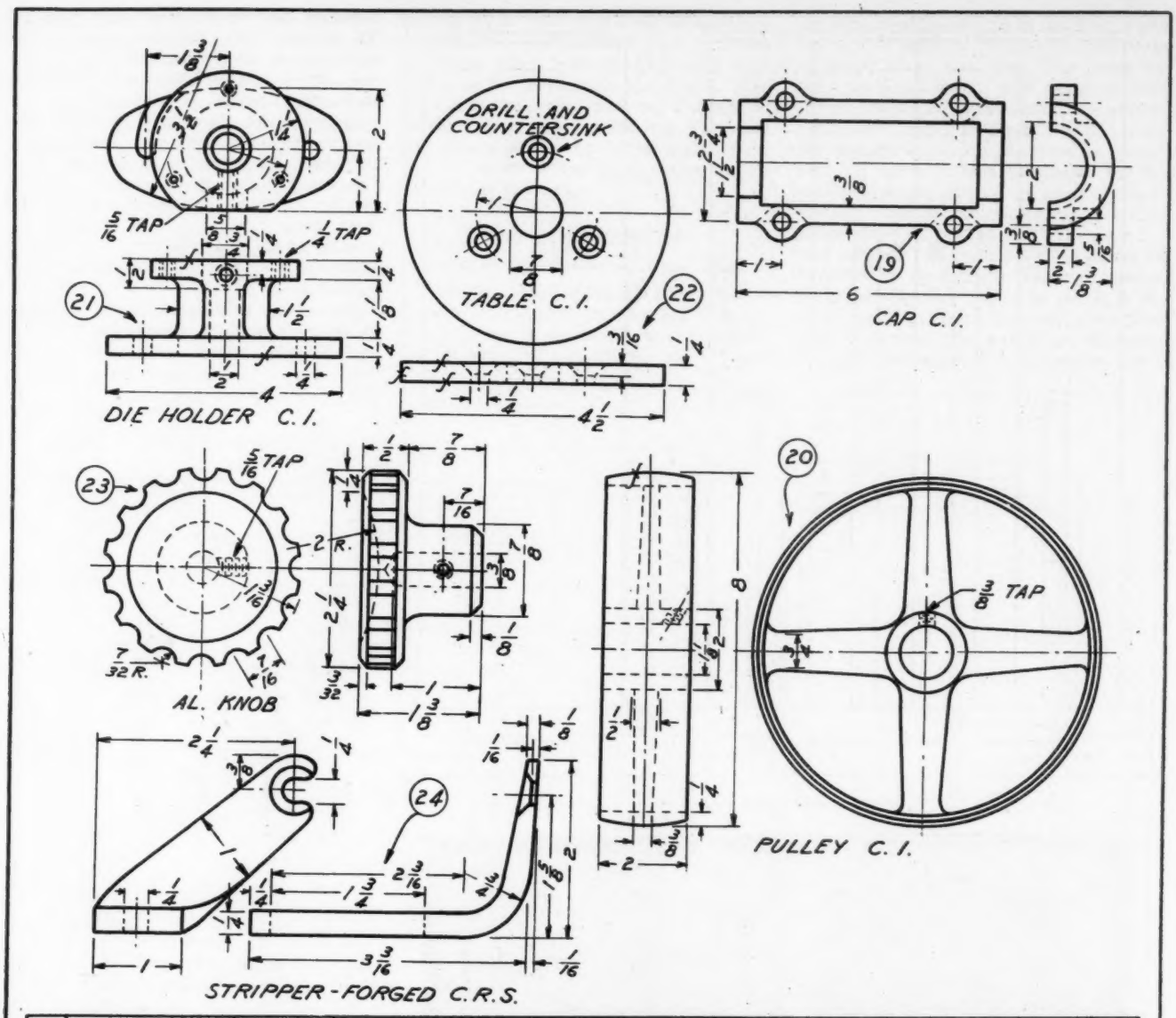
## NIBBLING MACHINE

**S. L. Coover, State Teachers College, California, Pennsylvania**

A nibbling machine is very useful in the sheet-metal and art-metal departments of the school shop. It can be used for cutting the more complicated shapes in sheet metal, such as inside and outside curves or various combinations of them.

Experience is not essential for the operation of this machine. It is safe because there are no exposed parts to endanger the operator. Material may be cut by following a scribed outline, or if duplicate pieces are to be made, a template is used. The machine can be used on 14-gauge, or thinner metal.

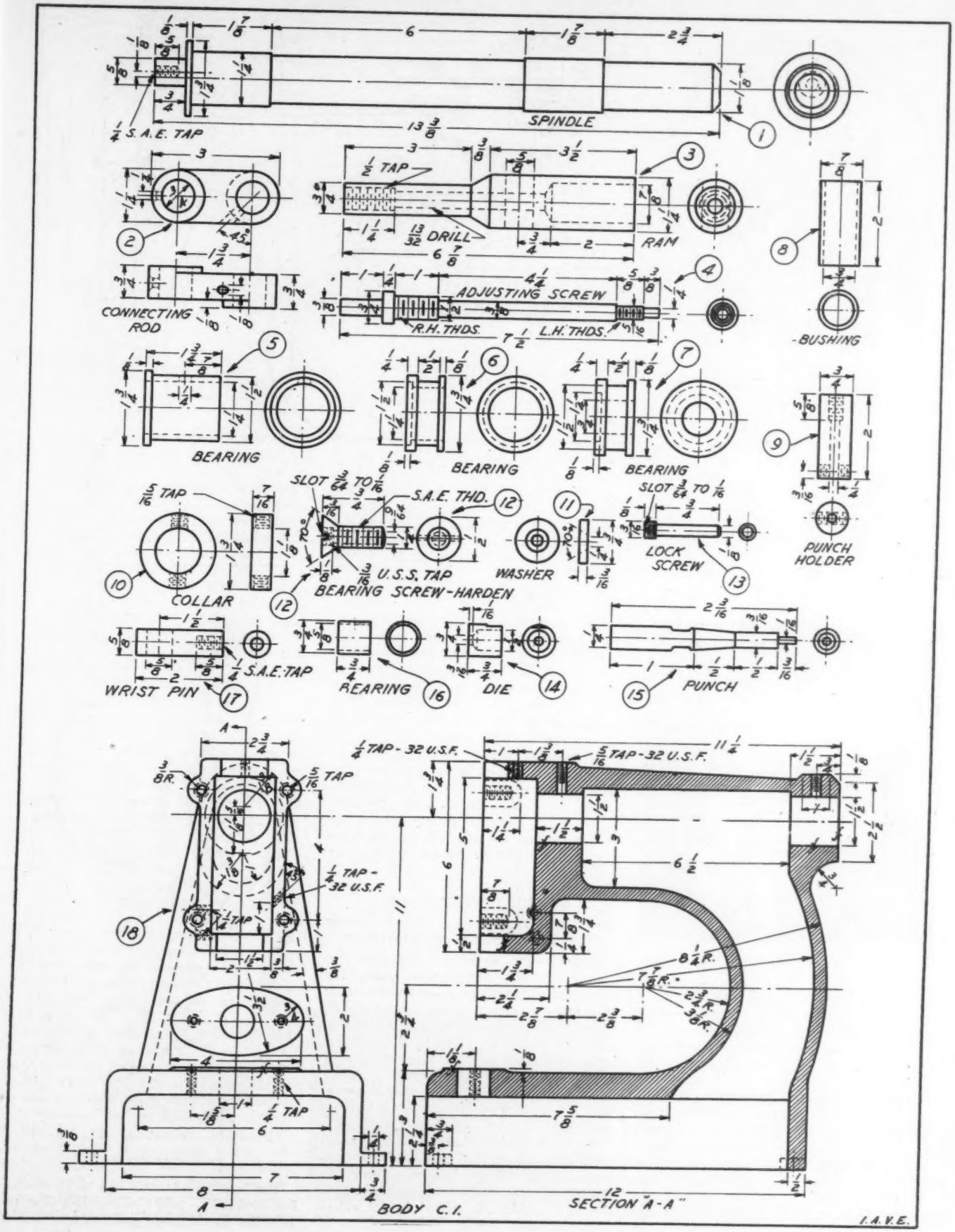
It is sturdy and will not get out of order easily. The frame is of cast iron and it is cored to give strength with the least weight. All the bearing holes and the faces of bearings are machined. The front of the head



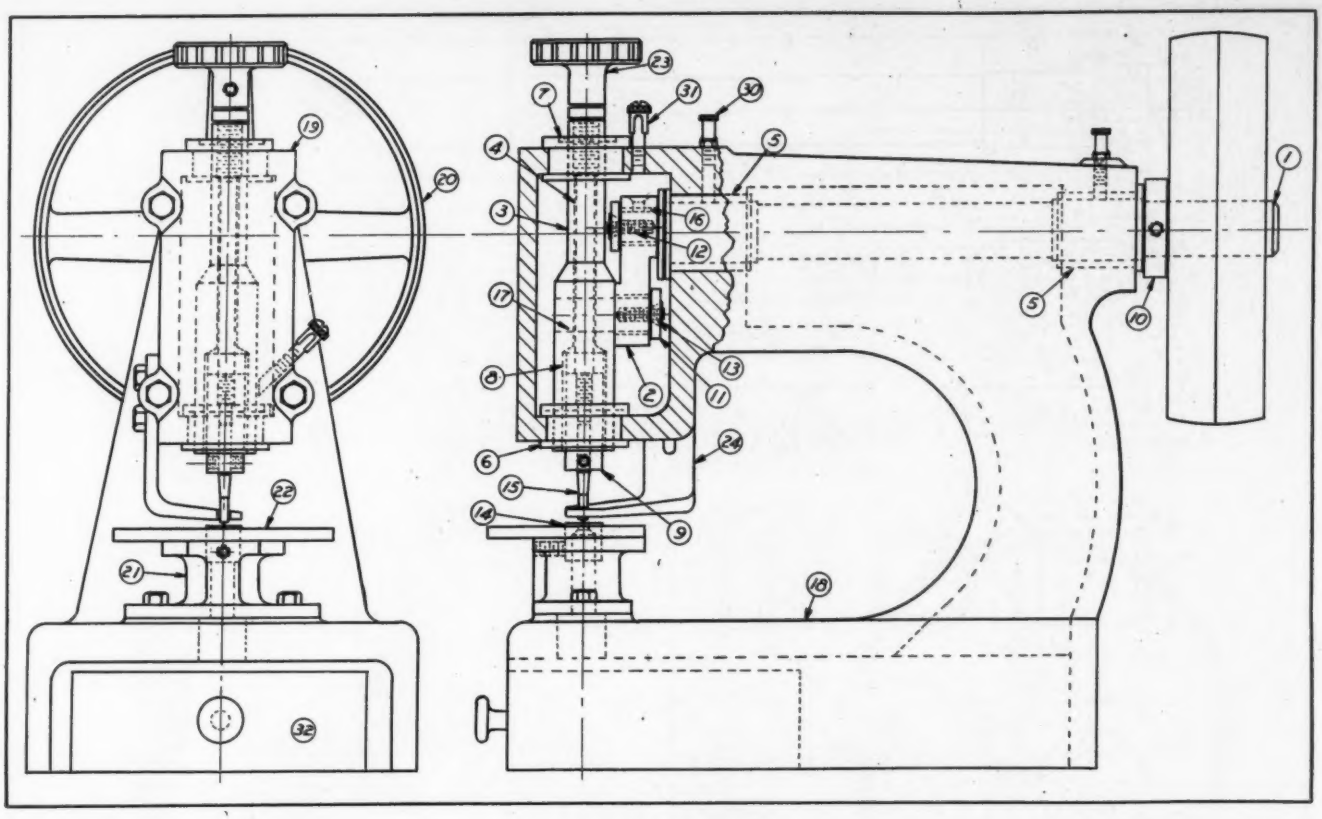

| NO. | NAME | MATL. | SIZE | REQ. | NO. | NAME | MATL. | SIZE | REQ. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SPINDLE | C.R.S. | $1\frac{3}{4} \times 13\frac{3}{8}$ | 1 | 17 | WRIST PIN | T.S. | $\frac{5}{8} \times 1\frac{3}{4}$ | 1 |
| 2 | CONNECTING ROD | C.R.S. | $\frac{7}{8} \times 1\frac{1}{4} \times 3$ | 1 | 18 | BODY | C.I. | | 1 |
| 3 | RAM | C.R.S. | $1\frac{1}{4} \times 6\frac{7}{8}$ | 1 | 19 | CAP | C.I. | | 1 |
| 4 | ADJUSTING SCR. | C.R.S. | $\frac{3}{4} \times 7\frac{1}{2}$ | 1 | 20 | PULLEY | C.I. | 2×8 | 1 |
| 5 | SPINDLE BEARING | BR. | $1\frac{3}{4} \times 1\frac{3}{4}$ | 2 | 21 | DIE HOLDER | C.I. | | 1 |
| 6 | RAM BEARING | BR. | $1\frac{3}{4} \times \frac{7}{8}$ | 1 | 22 | TABLE | C.I. | | 1 |
| 7 | " " | BR. | $1\frac{3}{4} \times \frac{7}{8}$ | 1 | 23 | KNOB | AL. | | 1 |
| 8 | BUSHING | BR. | $\frac{7}{8} \times 2$ | 1 | 24 | STRIPPER | C.I. | | 1 |
| 9 | PUNCH HOLDER | T.S. | $\frac{3}{4} \times 2$ | 1 | 25 | BOLT | | $\frac{5}{16} \times 1\frac{1}{4}$ | 4 |
| 10 | COLLAR | C.R.S. | $1\frac{3}{4} \times \frac{7}{16}$ | 1 | 26 | " | | $\frac{1}{4} \times 1$ | 2 |
| 11 | WASHER | T.S. | $\frac{3}{4} \times \frac{3}{16}$ | 2 | 27 | " | | $\frac{1}{4} \times \frac{3}{4}$ | 2 |
| 12 | SCREW | T.S. | $\frac{1}{4} \times \frac{3}{4}$ | 2 | 28 | SETSCREW | | $\frac{1}{4} \times \frac{1}{4}$ | 4 |
| 13 | LOCK SCREW | T.S. | $\frac{3}{16} \times \frac{7}{8}$ | 2 | 29 | " | | $\frac{5}{16} \times \frac{5}{16}$ | 4 |
| 14 | DIE | T.S. | $\frac{3}{16}$ | 1 | 30 | OILER | | NO. 2 | 2 |
| 15 | PUNCH | T.S. | $\frac{3}{16}$ | 1 | 31 | " | | NO. 1 | 2 |
| 16 | CON. ROD BEAR. | BR. | $\frac{3}{4} \times \frac{3}{4}$ | 2 | 32 | PAN | | 3 × 3 × 1 | 1 |

I.A.V.E.

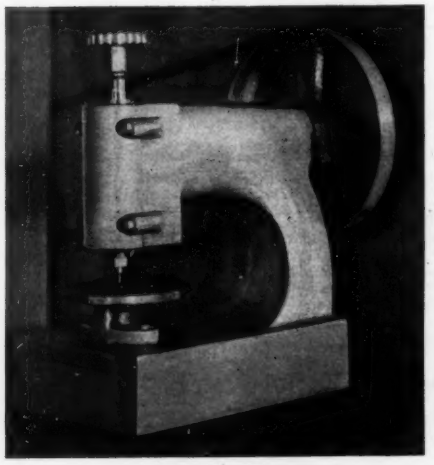
*Details of nibbling machine*




*Details of nibbling machine*




*Assembly of nibbling machine*



*Nibbling machine*

and the cap are planed and the holes for the four capscrews are drilled and tapped. After the cap is bolted securely in place the two holes for the ram bearings are bored and reamed. Bronze is used for all the bearings and oilers are placed so as to adequately lubricate each bearing. All working parts are inside of the hollow frame. By removing the pulley the whole assembly can be withdrawn from the front for easy adjustment or repair.

The adjusting screw is inclosed in the hollow ram and it is operated by a knob on top of the head of the machine. By means of this screw the punch can be raised to allow an inside cut to be made. The pilot regulates the size of the cut taken.

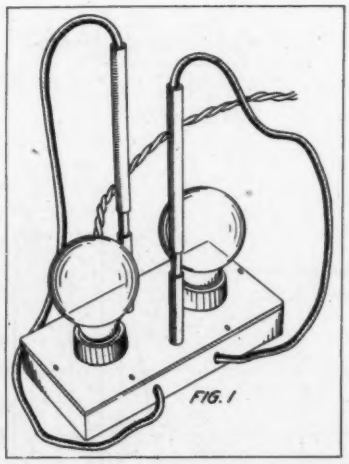
The stripper plate is forged from cold-rolled steel. It is secured by two bolts back of the head, and it is adjustable so that different gauges of metal may be cut, or to permit the use of a template. The template should be made from steel three sixteenths of an inch thick.

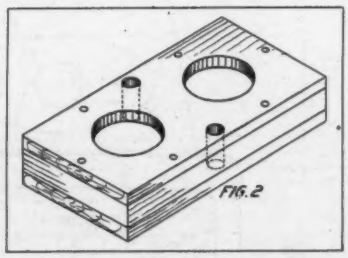
The machine operates best at a speed of three hundred revolutions per minute. The punch moves rapidly up and down cutting a small piece of metal on each downward stroke. It is only necessary to hold the material against the pilot of the punch to make either inside or outside cuts in any direction.

## 110-VOLT TEST LAMP

**Byron M. Taylor, W. Wilson Junior High School, San Diego, California**

Many devices have been developed for making continuity and "ground" tests. The one described and illustrated herewith is easily made and can be used on any lighting circuit. Figure 1 shows the finished tester. It is seen that two lamps are provided although one lamp would serve very well as an indicator of flow of current in the tester. The plug attached to the tester may be inserted in the line in two ways so that either of the test points may connect to the "hot" side of a 110–220-volt circuit thus (with one lamp) permitting a direct short to ground. Using two lamps, either side of the line always goes through one lamp and thus many blown fuses due to an accidentally grounded point will be avoided.




*110-Volt test lamp*

The base of the tester is a small wooden box arranged to hold two porcelain cleat receptacles for the lamps, and two fiber sockets

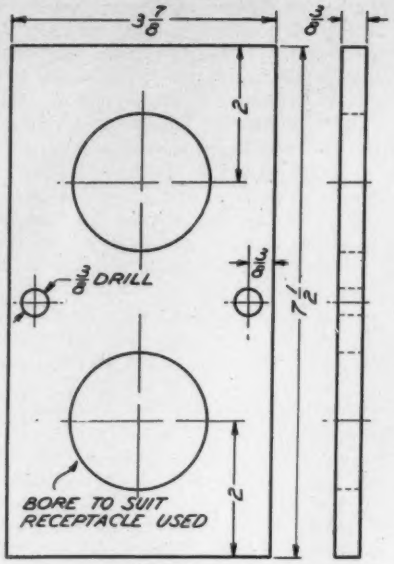


FIG. 3

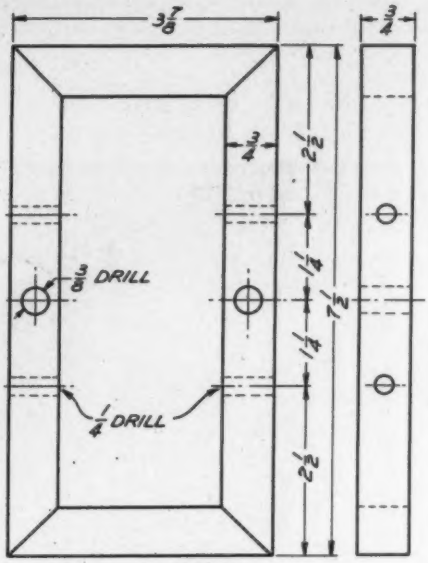


FIG. 4

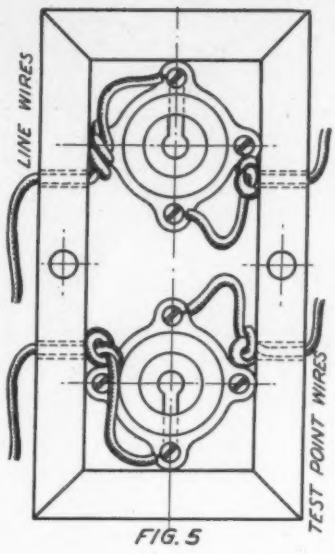


FIG. 5

to hold the test points when not in use. See Figure 2. To make the base, cut out two pieces of 3-ply wood, ½ by 3⅞ by 7½ in. In one of the pieces cut two holes slightly larger in diameter than the collar of the receptacles used. Also, bore two holes ⅜ in. in diameter. The positions of these holes are indicated in Figures 3 and 4. For the sides, cut out a strip of ¾ by ¾ by 24-in. white pine, and with it make a frame with 45-deg. bevel joints as shown in Figure 4. Fine nails may be used to secure the joints. On one side of the frame nail the blank piece of 3-ply wood. In the box thus formed place the two porcelain cleat receptacles as shown in Figure 5. Fasten them down with two No. 6 by ¾ in. r.h.b. wood screws. Wire the receptacles as shown in Figure 5. Use separately braided and twisted pair lamp cord. The lengths to be used will be dictated by individual requirement but 24 in. each will meet average requirements. Untwist one of the lengths to form separate leads for the test points. Insert the leads in the prepared holes as seen in Figure 5. Make knots and attach the bared ends of the cord to the receptacle terminals. Untwist enough of the remaining twisted pair to permit insertion of the ends, knotting, and attaching as for the test leads. Attach a plug to the other end of this pair.

Nail the top of the base in place with the collars of the receptacles projecting from the large holes. Glue the two 3⅜-in. pieces of ⅜-in. O.D. (1/16-in. walls) fiber tubing, into the ⅜-in. holes placed into the top and side pieces of the box.

To make the insulated test points, proceed as follows: Glue a piece of ⅛ by 5½-in. round brass rod into a piece of ¼-in. O.D. (1/16-in. walls) by 5¼-in. fiber tubing. Grind one end to a point about as shown in Figure 7. At the other end grind down the side of the tube and brass rod as shown in Figure 8. The handle for the test point consists of another piece of fiber tubing ⅜-in. O.D. (1/16-in. walls) by 4¾ in. long, as shown in Figure 7. Thread this on one of the test point leads. Bare the end of the lead and solder it to the bared brass of the test point — the handle being still on the lead. Set the test point firmly in the handle with glue and in the position shown seen in Figure 7. Repeat with the other test point.

Place two lamps in the sockets and plug into the light line. Place the test point tips together. If the lamps glow everything is in order. Painting the base in bright contrasting colors will aid in locating the tester when it is wanted, and also adds to its appearance.

Figure 9 shows the assembled test lamp ready for use.

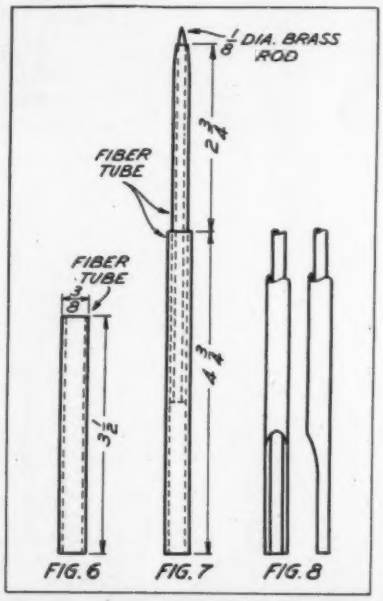


FIG. 6 FIG. 7 FIG. 8

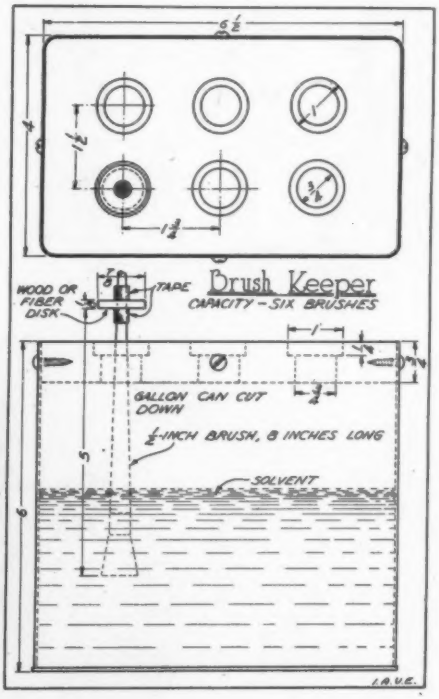
Fig. 9. 110-Volt test lamps

## MULTIPLE BRUSH KEEPER

V. E. Broadbent, Union High School, Santa Clara, California

The storage of small paint or lacquer brushes, ready for instant use, has long been a problem in the author's toymaking classes.

After many trials, the brush keeper described herein was evolved, and has proved very successful. As shown in the illustration, a 1-gal. can is cut down to about 6 in. in height. A wooden top is shaped to fit tightly inside the top rim. In this board is bored a



series of holes 1 in. in diameter and ¼ in. deep. Then in the center of each of these is bored a ¾-in. hole extending through the rest of the thickness of the board.

The brushes illustrated are up to ½ in. in width and are used for painting toys. Next, 6 pressed-wood disks are cut to fit loosely inside of the 1-in. holes. Holes are then bored in the center of these disks of such size that they will each hold one of the brushes tightly about 5 in. from the end of the bristles. Tape is then wrapped above and below each disk to keep it in place.

These disks not only keep the brushes suspended in the turpentine or thinner but also prevent the evaporation of the liquid when the brushes are not being used.

The same method can be used for a single wider brush. Anyone who has struggled to hang brushes on hooks, keep can covers in place, or string the brushes on wires will welcome this simple "foolproof" method of keeping brushes.

## A LETTER OPENER OF PLASTIC MATERIAL

**J. B. Livingston, Ponca City, Oklahoma**

Letter openers made of the new plastic materials, present interesting, yet simple projects. They may be made of the same material and color as that used for the penholder described on page 75 of the February issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. One of the five popular designs shown in Figure 1 may be used, or an individual design may be developed.

### Materials and Tools Required

Use sheet stock 3/16 or ¼ in. thick for these letter openers. Plastic materials may be obtained in the form of 6 by 8-in. sheets. Such a sheet will yield six or seven letter openers of average size.

Have at hand an 8-in. flat file, a coping saw fitted with a fine-tooth blade, fine sandpaper, Speedwet paper of 240 and 320 grits, buffing cloth, and buffing compounds No. 1 and No. 2.

### Pattern Layout and Cutting

Before tracing the pattern outline on the material, sand off the glaze on one side of the sheet so pencil marks will show better. Use carbon paper between the pattern sheet and the material, or glue the pattern directly to the stock sheet. Saw around the outline leaving a small margin for dressing down to exact pattern with the file. A fine-tooth coping-saw blade will leave a minimum of saw marks to be removed from the edges prior to polishing. Saw the work over a V-notched board or clamp it securely in the vise. See Figure 2. Where power-driven jig saws are available, the cutting-out operation is more easily and quickly done.

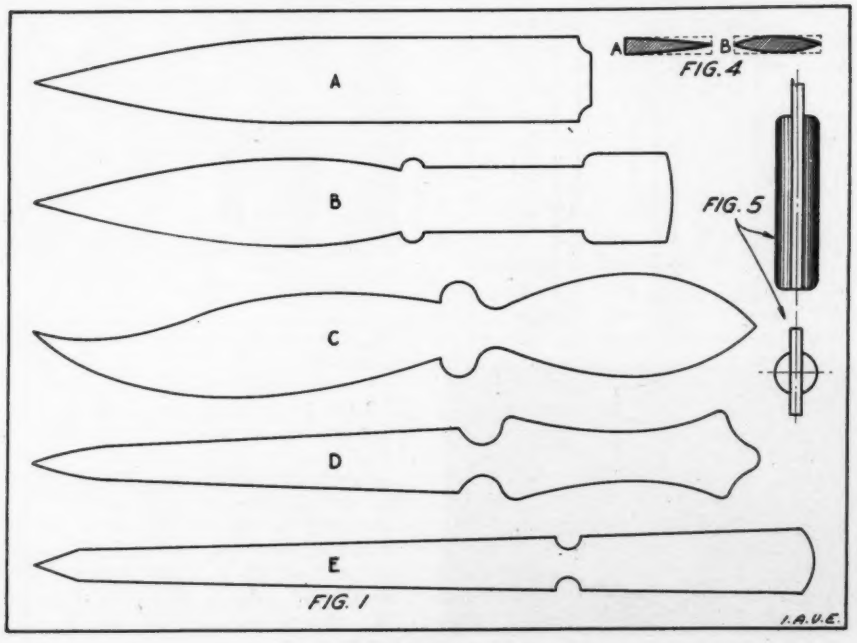
*Fig. 2. Method of holding plastic sheet for sawing out around pattern*
*Fig. 3. Dressing knife with file after having been sawed out*

The sawed-out letter opener is then dressed with the flat file to remove all saw marks. See Figure 3. Smooth up the handle portion first. File away all excess material lying outside the pattern outline, and also round the edges slightly for comfort in handling. Now file the blade section to a knifelike edge something like the one shown at A in Figure 4. For a symmetrical blade, lay out a middle line along the length of the blade edge that is to be sharpened. File down to this line from each side of the blade. If both edges of the blade are to be sharpened, lay out the middle lines along both edges and also draw a middle line on both *sides* of the blade. In the latter case, the finished blade will be thickest at the middle and will taper both ways toward the edges, as is shown at B, Figure 4.

### Finishing and Polishing

Too much emphasis cannot be placed upon the sanding and smoothing to be done prior to buffing. Use the fine sandpaper first for removing the deeper scratches and tool marks left by the file or saw. Then follow up with the Speedwet papers, 240 grit first and then the 320 grit, keeping them wet constantly. The polishing processes, described on page 76 of the February, 1937, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION should follow the wet abrasive treatment.

After the polishing is completed, an initial, name, or design may be scratched into the polished surface with a scratch awl and filled in with lacquer or crayon of some pleasing color. A jig-sawed design from thin metal may be cemented to the handle for another effect. Plastic sheets also may be cemented to each side of the handle, or a round rod may be split with the saw and one half of it cemented to each side of the handle, as shown in Figure 5.




*Letter-opener designs*

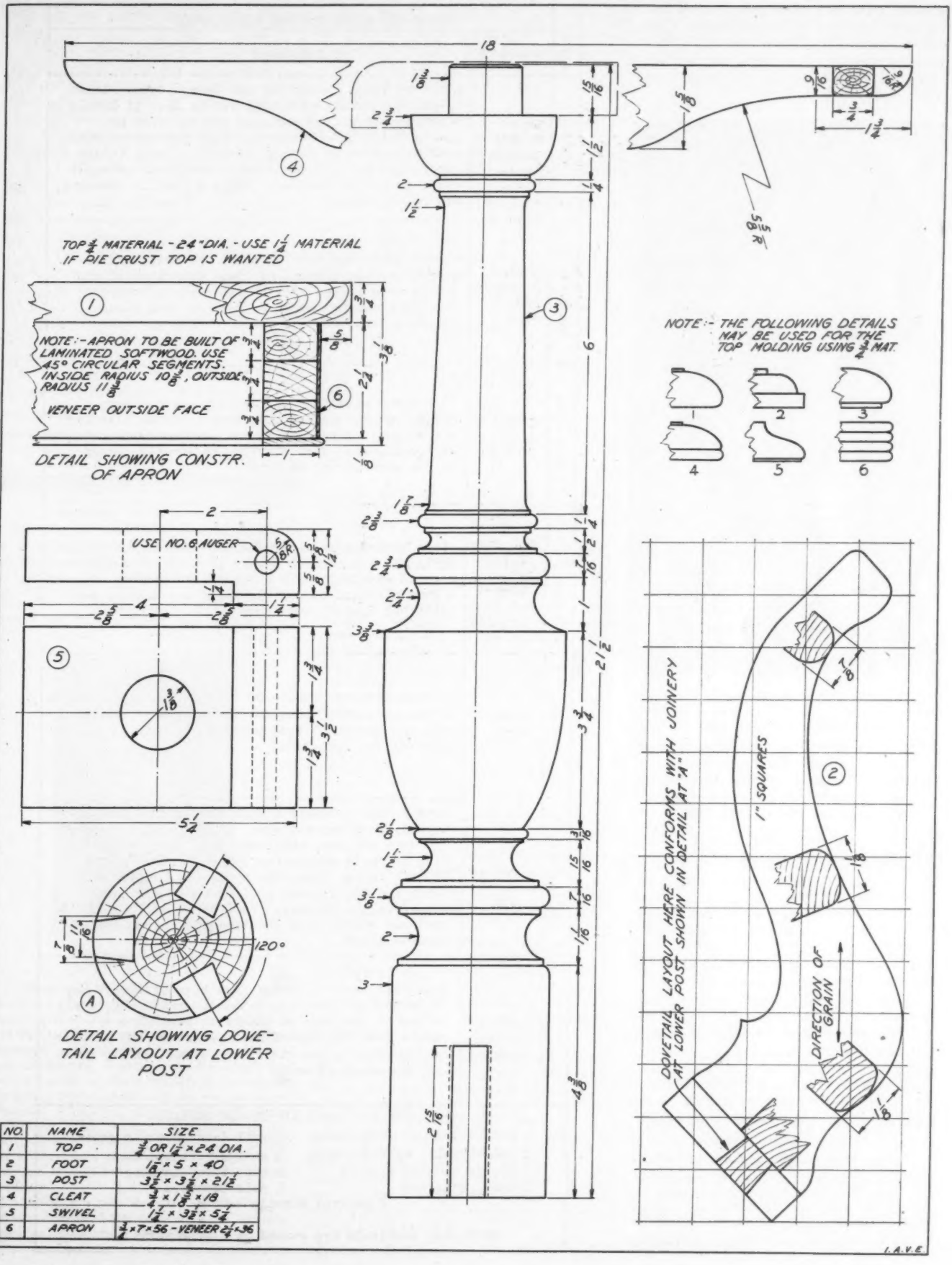
## TILT-TOP TABLE

**William K. Sherinyan, Benjamin Franklin High School,**
**Los Angeles, California**

This table is essentially a turning project. The 24-in. top is turned on a 12-in. faceplate and the post is turned on any 36-in. school speed lathe.

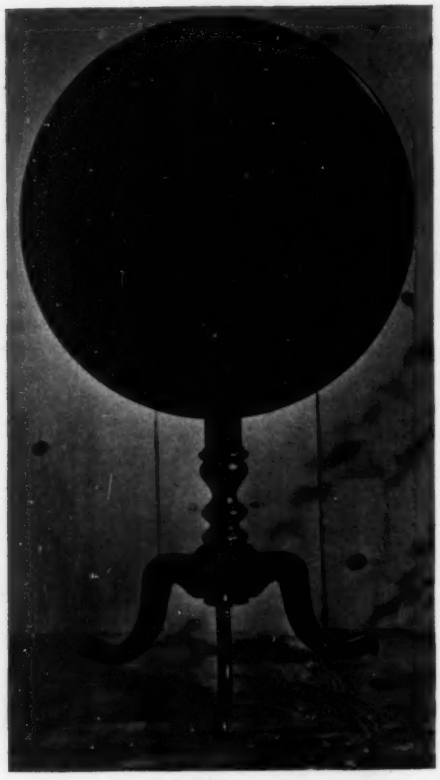
The teaching value in modeling the feet included a variety of bench operations common to second-year high-school student experience. The dovetail is not tapered. Material for the swivel block should be hardwood in order to guarantee long-life performance. A barrel bolt or a simple wooden pin may be used as a lock for the top tilt.

Finally, in finishing a piece of this character,


TOP ¾ MATERIAL - 24" DIA. - USE 1¼ MATERIAL IF PIE CRUST TOP IS WANTED
NOTE:- APRON TO BE BUILT OF LAMINATED SOFTWOOD. USE 45° CIRCULAR SEGMENTS. INSIDE RADIUS 10⅜, OUTSIDE RADIUS 11⅜
VENEER OUTSIDE FACE
DETAIL SHOWING CONSTR. OF APRON
USE NO. 6 AUGER
NOTE:- THE FOLLOWING DETAILS MAY BE USED FOR THE TOP MOLDING USING ¾ MAT.
DETAIL SHOWING DOVE-TAIL LAYOUT AT LOWER POST
DOVETAIL LAYOUT HERE CONFORMS WITH JOINERY AT LOWER POST SHOWN IN DETAIL AT "A"
1" SQUARES
DIRECTION OF GRAIN
I.A.V.E.

| NO. | NAME | SIZE |
|---|---|---|
| 1 | TOP | ¾ OR 1¼ × 24 DIA. |
| 2 | FOOT | 1⅞ × 5 × 40 |
| 3 | POST | 3½ × 3½ × 21½ |
| 4 | CLEAT | ¾ × 1⅝ × 18 |
| 5 | SWIVEL | 1½ × 3½ × 5¼ |
| 6 | APRON | ¾ × 7 × 56 - VENEER 2¼ × 36 |

swab the wood with water several times and thoroughly sand with No. 4/0 sandpaper. Then apply a liberal coat of boiled linseed oil. This treatment gives the top and the other members a delightful satin finish which improves from year to year.



*Tilt-top table*

## FIRST AID IN THE SHOP

William W. Willis, South High School, Denver, Colorado
Delmar W. Olson, Industrial Arts Supervisor, Clinton County Educational Department, Wilmington, Ohio

### General Rules

1. Injuries causing continued severe pain or excessive bleeding should receive the attention of a physician.
2. Immediate attention to all injuries, no matter how slight, lessens the danger of infection.
3. Never cleanse an open wound with soap and water. Use rubbing alcohol.
4. Tincture of iodine should be applied only once.
5. Tincture of iodine should not be covered with bandages until dry.

## INFORMATION ABOUT THE MORTISING MACHINE

C. A. Conley, Brewster Vocational School, Tampa, Florida

The mortising machine requires just as accurate adjustment as any other machine in the shop. You should be able to adjust it, change the bits, and set it up for cutting different size mortises.

The following list of questions and answers

| Injury | Caused by | Treatment |
|---|---|---|
| Cuts | Knife<br>Chisel<br>Broken gear | Allow to bleed freely but not excessively. This cleans the wound and washes out germs. If little bleeding occurs, encourage a greater flow by gently "milking" the wound. Wipe away blood with swab saturated in rubbing alcohol. Apply iodine generously in and around wound with swab or applicator on bottle stopper. Apply a sterile dressing, and bandage snugly |
| Punctures | Nails<br>Scribers<br>Awls<br>Wire | These wounds are usually small but deep, and require thorough cleansing. Wash with alcohol and gently work iodine into entire depth of wound. A sterile dressing should be applied even though bleeding does not continue |
| Lacerations | Saws<br>Jagged tools | Sufficient bleeding will usually occur. Deep wounds of this nature may cause arterial bleeding sufficiently severe to require a sterile compress or tourniquet. When bleeding is stopped, treat in the same manner as cuts |
| Burns | Open flame<br>Hot surfaces<br>Hot vapors<br>Hot liquids | Clean burned area carefully with rubbing alcohol. NEVER USE IODINE ON A BURN. If there is a blister, open it carefully with a sterilized needle. Spread a burn ointment on sterile gauze and bandage securely but loosely over burn |
| Bruises | Blows<br>Falls | Bruises usually require no treatment. Applications of ice or cloths wrung out of cold water relieve pain and prevent discoloration. If skin is broken, treat as any open wound |
| Eye troubles | Foreign bodies in the eye | DO NOT RUB. Consult a physician if the body is imbedded. Close the eye. Gently pull the upper lid down and over the lower lid. Hold until the flow of tears washes the object to corner of eye. If this fails, grasp the upper-lid lashes between thumb and forefinger, pull downward and outward away from the eyeball. Look up under lid for object and remove with moistened corner of clean handkerchief |
| Blisters | Chafing<br>Hitting<br>Pinching | Blood and water blisters (not burn blisters) may be caused by pinching, hitting, or chafing. Apply iodine on one edge of blister. Sterilize a needle over the open flame. Puncture the blister at its edge in the sterilized area. Gently press out the blood of water |

**FIRST AID CHART FOR THE SCHOOL SHOP**

**WHAT THE FIRST AID KIT SHOULD CONTAIN**

1 bottle 3 ½ per cent iodine
1 roll 1/2-in. adhesive tape
1 bottle rubbing alcohol
1 small scissors
1 roll 1-in. sterile gauze
1 medium-size needle
1 tube burn ointment
1 pair tweezers
1 package sterile cotton

**Most shop accidents are caused by CARELESSNESS!**

will help you a great deal in using this machine.

1. What causes stock to be mortised out of square? Out of place? Not deep enough?

*A.:* Wrong setup of the mortise machine, table not square with bit, wrong adjusting of stop, table too low.

2. What is the theory of cutting in a mortising machine?

*A.:* Combination of hollow chisel and boring bit.

3. What trade judgment should the operator use in determining on what side or sides of the stock the mortise should be cut?

*A.:* The grain of the wood in the piece of stock to be mortised must be considered.

4. What happens when the chisels or bits are dull?

*A.:* The stock burns, bits get hot, a poor job is obtained, stock is spoiled, and the heat takes the temper out of the bit.

5. What happens when the lips of the bit do not provide sufficient clearance?

*A.:* The bit gets hot and a poor cut results.

6. If the stock is warped or twisted, what effect does this have upon the shape or position of the mortise?

*A.:* This will cause the mortise to be out of place, or, crooked.

7. How frequently should checkups be made?

*A.:* It is well to check up on your cut after cutting the first mortise, then recheck every fourth or fifth one.

8. What results occur when chips or cuttings are allowed to accummulate on the bed?

*A.:* The mortise will be cut on an angle to the face of the piece of stock or the bit is likely to cut through on one side and spoil the job.

9. How long does it take to set up the mortiser, assemble stock, make a trial cut, and check up the results?

*A.:* It should not take over 5 minutes if the operator understands what he is attempting to do.

10. If stock is spoiled in mortising, what effect does that have upon the cost of production?

*A.:* It not only adds to the price of the piece of stock spoiled, but it causes a delay in getting the job out, and where there is a delay there is always an added expense.

11. What is likely to happen if the rod gauge is not securely locked?

*A.:* The stock will be raised up by the bit as it leaves the stock and is likely to split or otherwise spoil the stock.

12. What happens when the stock is out of square? Is in wind? Is warped?

*A.:* The mortise will be crooked or out of place, thus spoiling the job.

13. What accidents are likely to occur while working on or about a mortiser?

*A.:* Cut fingers, loose clothing caught in the machine, chips in the eyes, electric shock.

14. What causes burnt stock?

*A.:* Dull chisel or bit, wrong setup.

# Personal News

### Appointed Assistant Director

Mr. Alfred P. Smith, who was formerly a teacher of industrial arts in the public schools of Indianapolis, Ind., has been recently promoted to the position of Assistant Director in Charge of Industrial-Arts Instruction. His new position carries with it the supervision of more than sixty junior high schools and six senior high schools in the city.

*Alfred P. Smith*

A graduate of the high school in Terre Haute, Mr. Smith continued his education at the Indiana State Teachers' College, where he received his B.S. and M.S. in Education. Later he studied at the University of Pittsburg.

In Homestead, Pennsylvania, Mr. Smith became a teacher of related subjects in the Schwab Vocational School. Afterward, he was named as instructor in drafting and related mathematics at Kokomo, Ind. In 1929, he entered the Indianapolis school system as a teacher of industrial arts in the junior high school. This position he continued to hold until appointed to his present position.

Mr. Smith is a member of Epsilon Pi Tau, an honorary industrial-arts fraternity, the National Education Association, the Indiana Industrial-Education Association, Western Arts Association, Indiana Vocational Association, and the American Vocational Association.

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Mr. William H. Winger has been elected instructor in industrial arts in the high school at Port Huron, Mich.

Mr. Francis Thompson has been appointed instructor in the automobile department of the vocational school at Medford, Mass.

Dr. William E. Grady, associate superintendent of schools in charge of the vocational education division of the New York City schools, was recently given a medallion for outstanding work in vocational education. The medal was presented by the New York State Vocational Teachers' Association at their annual meeting on January 3.

Mr. Alfred Owen, a former teacher in the vocational school, Milwaukee, Wis., died in Chicago, of injuries received in an automobile accident. He was a graduate of the United States Naval Academy, and had taught at Harvard School for Boys, before going to Milwaukee eight years ago.

Mr. Kenneth L. Bing, of Glencoe, Minn., has become a member of the faculty of the State Teachers' College at Statesboro, Ga. Mr. Bing was formerly an instructor in the University High School at the University of Minnesota.

Mr. Augustus C. Phillips, who has become Director of the Division of Mechanical Arts at the Virginia State College in Petersburg, was formerly an instructor in the Agricultural and Mechanical College at Tallahassee, Fla. Mr. Phillips holds two degrees given by the University of Minnesota.

E. A. T. Hapgood has been re-elected as superintendent of schools at Mount Morris, N. Y. Mr. Hapgood was for many years director of vocational education, and was formerly principal of the Albany Industrial High School.

During Mr. Hapgood's period of service in Mount Morris, a number of progressive features have been inaugurated in the schools, including industrial arts for boys and girls, club and student activities as part of the school program, an enriched program, and a new system for custodial care of school property.

Mr. A. P. Twogood has joined the faculty of the Iowa State College, Ames, Iowa, as Associate Professor of Vocational Education, in the extension service for vocational teacher-training and foreman-training work.

Mr. L. L. Gore, Director of the Industrial Education Department at the George Peabody College for Teachers, Nashville, Tenn., has completed the residence requirement for the doctor of education degree at Teachers College, New York. Mr. Gore will be given the degree upon the completion and acceptance of his project.

Dr. Frank W. Dalton has been appointed Assistant State Supervisor of Industrial Education for Michigan. Dr. Dalton served for many years as head of the Ionia Continuation School. Last year he was engaged in establishing an apprentice program in Lapeer. In his new position, Dr. Dalton will work under K. G. Smith.

Mr. George C. Vidrine, San Antonio, Tex., has been elected head of the Texas Classroom Teachers' Association. Mr. Vidrine, who has been a teacher of general metalwork in the Emerson Junior High School of San Antonio, has been a leader in the classroom teachers' activities for a number of years.

Mr. B. U. Miles has been elected head of the department of industrial-arts education in the Southwest Texas Teachers' College, at San Marcos. He holds degrees given by the A. and M. College of Texas and by Columbia University. For the past two years he has been supervisor of vocational and adult education in Corpus Christi.

Mr. J. A. Clayton, formerly head of the industrial-arts department in the State Teachers' College, San Marcos, died recently as a result of injuries received in an automobile accident.

Mr. Cecil Collins, supervisor of industrial arts at Beaumont, Tex., has been assigned the added work of superintendent of buildings and grounds for the entire school system.

Mr. Victor H. Pyeatt is the new instructor in printing in the Dallas Technical High School, Dallas, Tex.

Mr. Percy Depuy has been appointed director of evening classes at Manhattan, Kans.

Fred Krieg and William P. Ryan have been reappointed as members of the board of vocational education at Menasha, Wis.

# Association News

The New Jersey Vocational and Arts Association will hold its annual meeting on March 17, 18, and 19, in Asbury Park, N. J.

The annual banquet will be held on Friday evening under the direction of Miss Mildred Johnson.

The Friday afternoon general session will be held in the Crystal room of the Berkley-Carteret Hotel, with Martha Berry, general program chairman in charge.

A get-together meeting, sponsored by the state department, is set for Thursday evening. A program especially arranged for supervisors and directors will be in charge of Mr. McCarthy and his associates.

The art section, under the direction of Marion Q. Cooke, will present a fine-arts program. The exhibition of students' work will be of a highly selected type.

The all-vocational meeting on Friday is in charge of Mr. Beebe. A number of sectional meetings also will be held at which Mrs. Patrick Henry Adams, and George A. F. Hay, of the Ridgewood High School, will speak.

The industrial-arts teachers will be addressed by Mr. D. J. Tew, of Camden, on the subject "The Place of Industrial Arts in Secondary Education."

On Friday afternoon the subject "For What Are We Training Our Pupils?" will be discussed by Mr. Fred Pumphrey, Rutgers University, and Mr. Charles H. Beck, of the Calco Chemical Company.

The Girls' Vocational Section will discuss the subject, "How Shall We Staff Our Expanding Program?" Recruiting teachers from industry, practical tests for applicants, and other topics will be discussed by Mrs. O'Leary, Helen Livingston, of Albany, N. Y., Mr. Marshall of Newark, and Dr. Bixby of Rutgers University. Dr. Lowery, of the Middlesex County schools, will summarize the discussions.

General and specific placement problems will be discussed by the New Jersey Guidance and Personnel Association, Harold G. High, Robert Williams, and Joseph Jeffreys.

The printing section will be addressed by Sol. Hess, Mr. Vosburg, and J. Henry Holloway, on topics of interest to printing teachers.

The boys' section will listen to an address by Mr. Strahan, of the New Jersey State Department, on the subject "Legal Liabilities of Schools and Teachers in Connection with Pupils' Injuries."

At least 29 firms have already reserved space for their exhibits. In addition to the industrial displays, there will be an exhibition of industrial-arts projects to be arranged by Mr. Campbell and a special committee. The exhibit of the art section is expected to be of special interest.

The annual conference of the Connecticut Industrial-Arts Association will be held March 25 and 26, in New Britain.

Mr. Emmett O'Brien, director of the Boardman Vocational School at New Haven, will speak on "Industrial Arts and Vocational Education," and Dr. Willard S. Price, of the Connecticut Teachers' College, will give an address on "Industrial Arts and General Education."

A new feature this year will be a tour through the industrial-arts plants of New Britain.

Mr. John S. Johnson, New Haven, will be the toastmaster at the 4 o'clock luncheon meeting, at which Dr. Ashley will speak on "What Now in Industrial-Arts Education?" Mr. Elroy W. Bollinger, Albany, N. Y. will lead in the final discussion of the conference.

The business meeting will be held on Saturday morning, after which the topic "What Now in Industrial-Arts Education?" will be discussed.

Extensive displays by a number of firms who furnish equipment for school laboratories are being planned.

The Central Connecticut Industrial-Arts Association held its annual meeting in the Hartford High School, on Wednesday, January 12, with fifty members in attendance.

The meeting opened at five o'clock and a full hour was given to a tour of the exhibits in the several shops. A dinner was served at six o'clock in the cafeteria.

In the absence of the chairman, Mr. Andersen, President Ginns introduced the first speaker, Mr. F. M. Martin, of Gloucester, Mass. He spoke about the different glues manufactured by his company and gave out samples of glue.

The next speaker was Mr. Anthony Marinaccio, of Hartford, who gave an interesting account of his trip to the American Vocational Association meeting in Baltimore.

Mr. Reeves spoke about possible law suits against shop teachers. The president appointed a committee of three to make a report on this matter at the next meeting.

Two men from the State Teachers' College, in New Britain, were introduced.

At the business meeting, the association listened to the reports of the secretary and treasurer.

The following officers were elected:

President, Samuel Bassett, Waterbury; first vice-president, Frank Preston, Hartford; second vice-president, John Iles, Bristol; secretary, Robert Ardini, Hartford; treasurer, Clifford Sawyer, Windsor.

Following the business meeting there were a number of round-table discussions as follows: Woodwork, James Heath, chairman; general shop, Gordon Hill; printing, Anthony Marinaccio; mechanical drawing, Arthur Groth; general metal, John Iles. — *Harry A. Barnicle.*

The program for the 1938 meeting of the Western Arts Association, to be held April 20–23, inclusive, in Milwaukee, Wis., promises to be wide in its appeal. The convention theme will be "The Arts at Work in Education," and a group of brilliant speakers has been provided to make the keynote meetings of absorbing interest, maintaining a program of the highest quality.

Mr. Alfred G. Pelikan, general chairman of the program committee, has large and enthusiastic committees at work, which promise both educational stimulus and "gemütlich."

Elizabeth Gilmartin, Toledo, Ohio, program chairman, with the special help of Bernice Setzer, Des Moines, Iowa, Orville Sink, Muncie, Ind., and Hazel Rennoe, Milwaukee, Wis., has secured a slate of speakers, which will cover the wide range of present-day activity in the arts. Vice-President William H. Varnum, of the University of Wisconsin, is general advisor on the central program committee.

Wednesday will be opening day for the exhibits and the afternoon session will discuss "The Arts in Community Life."

Thursday's topic will be "The Arts in General Education."

Friday's topic will be "The Arts in Relation to Each Other."

There will be a number of sectional sessions on both Thursday and Friday, each in charge of a chairman.

The fifth and general session on Saturday will take up the topic "The Index of American Design," and Dr. Lazlo Maholy-Nagy will be the speaker. There will be a business meeting and the presentation of reports from the various committees. The distribution of the ships prizes, and a trip to Kohler Village will be other features of the day's offerings.

Information concerning the meeting and the speakers may be obtained by writing to Jane B. Welling, 630 Glynn Court, Detroit, Mich., or to Harry E. Wood, secretary, 5215 College Ave., Indianapolis, Ind.

The Mu Sigma Pi Fraternity held its annual election banquet at Botsford Tavern, Detroit, on January 15, with F. E. Searle as toastmaster, and Philip A. Adler as guest speaker.

Following the dinner, President Gerald Baysinger presented the speakers, Mr. Searle, Dr. Warren E. Bow, Earl L. Bedell, Harold J. Van Westrienen, and Alva C. Tagg.

Leo Stawecki, editor of the 1937 yearbook, presented the first copy of the book to Dr. John H. Trybom, to whom the book is dedicated.

John Mihelcic presented the past president's key to Gerald Baysinger. Robert B. Teeple read a telegram from Dr. C. E. Johansson, and a letter from K. G. Smith of Lansing.

During the business meeting, the nominating committee presented the names of candidates for 1938, comprising O. R. Dickerson, president; Leon Sapala, vice-president; E. H. Stolting, secretary; and Cleveland E. Rossman, Heram E. Jackson, and Norvan Jennerjahn, executive board. These were unanimously elected.

Walter Jeske and Harold Silvius presented the recommendations of the special membership committee, which were adopted.

Mr. Philip Adler, of the *Detroit News*, in a talk, discussed the political movements in Europe at the present time.

The Zeta Chapter of the Epsilon Pi Tau Fraternity held its initiation program in the Industrial Arts Building of the Northern Illinois State Teachers' College, in DeKalb, Ill., at which time the annual banquet was held and seven new members were initiated into the fraternity.

The fraternity has planned another meeting, to be sponsored by the Chicago group as was done last year at Armour. The Zeta chapter will hold one local meeting each month, which will be at the Teachers' College, for those members now in school, as well as those members in the field who are in such close proximity that they will be able to attend. These meetings, which will be rather informal, will be given over to the discussion of current topics of the day.

The officers of the chapter for the year 1937–38 are:

President, Emil Danousky; vice-president, Kenneth Paulson; secretary-treasurer, John Clark.

The second annual convention of the New England Industrial-Arts Teachers was held at the Hotel Lenox, in Boston, Mass., on November 5 and 6. Mr. A. O. Bacon acted as chairman.

The banquet, on Friday, was attended by 150 members and friends of the association. Mr. Bacon, toastmaster, introduced Mr. W. J. West, of the U. S. Department of Justice, who gave a talk on "Fingerprint Identification."

At the business meeting, President Feuerstein received the reports of the chairman of committees.

The organization breakfast, on Saturday, provided the pep for the day. Later the members made a tour of the Mechanic Arts High School, where a fine display of industrial-arts work was shown.

The following officers were elected:

President, Morris P. Cates, Portland, Me.; vice-president, John Cave, New Haven, Conn.; Secretary, Willis B. Anthony, Fitchburg, Mass.

New Haven was selected as the meeting place for 1938. Arthur Feuerstein was elected chairman in charge of the convention.

(Continued on page 10A)

# DISSTON SMALL SAWS

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IN school workshop, complete equipment is important . . . there should be a saw to do each particular job better. Disston realizes the need for many types of saws in vocational education.

Disston, too, knows the need for quality. In 1855, the first crucible saw steel ever made in America was produced in the Disston plant. Disston Saw Steel gives you tools that are a credit to vocational training.

For many years, Disston has issued charts and educational literature for the use of instructors.

In addition, Disston years ago adopted a service of repairing and refitting school equipment, at nominal cost, in order that schools could get the best possible results from equipment used.

Samples of Disston Hand Saw, File, and Hack Saw Charts, and educational literature will be sent to instructors on request. Ask also for Disston Refitting list for school requirements. Write to:

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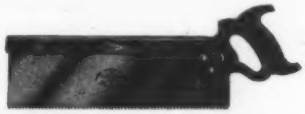
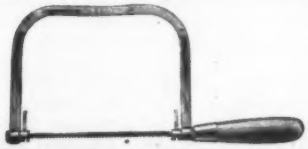


**Disston No. 4 Back Saw**—Handiest of all small saws. Use it for fine joinery and cabinet work. Blade of Disston Steel—hard, tough. Teeth shaped for fast, accurate cutting. Back of extra-heavy, polished steel. Beechwood handle with Disston weatherproof finish: brass screws. 5 sizes: 8" to 16" blades; 16 to 12 points.

**Disston No. 2 Compass Saw**—Open grip handle for easy control. Disston Steel blades, toothed to point. Taper-ground for clearance. Tempered to stand strain of curve-cutting. Applewood handle; Disston weatherproof finish; brass screws. 8 point. Sizes: 10, 12, 14, 16 inches.

**Disston Dovetail Saws Nos. 68, 70, 71**—For dovetailing, tenoning, model building, pattern making . . . wherever finest possible joint is needed. No. 68 (illustrated) has straight handle. No. 70, open grip handle. No. 71, same as No. 68, with handle and blade offset to permit cutting with blade flush to board. All extremely thin (.018"), with fine teeth (17 points). Sturdy brass-plated steel back supports Disston Steel blade.



**Disston No. 10 Coping Saw**—Frame of Disston Steel, 4½" from tooth edge of blade to inside of back. Polished hardwood handle. Nickel-plated ferrule, machined stretchers. Blades available for cutting wood, bakelite, brass, celluloid, bone, composition board, copper, other metals.

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The steel bench illustrated shows the No. 1B-2103 Storage Unit. Other drawer arrangements are available in both single and double-sided benches. Frame is of steel, finished in olive green. The drawer units are finished in natural birch to match the 2¼" thick edge grain maple top. This is the ideal, long-life bench for manual training departments.

**See the newest and best in Manual Training Benches . . . the Hamilton-Invincible *Steel* Bench . . . before you buy. It has the strength and rigidity of steel. Built with all-welded sky-scraper construction. Diagonal steel braces are welded to the heavy steel channel frame at the sides and back. It is built to last . . . the lifetime table for the Manual Training Department. Write today for full information.**

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*Authorized Representatives in all principal cities*

Two Rivers Wisconsin


(Continued from page 174)

The program committee of the Michigan Industrial-Education Society has completed plans for the annual convention of the association to be held at Detroit. The convention headquarters will be in the Book-Cadillac Hotel, and the dates for the meeting will be April 28, 29, and 30.

The caliber of the men who will take part in the program will be equal to that of any group brought together in any state convention. Among the well-known speakers who will take part are Dr. Edwin A. Lee, Dr. George E. Myers, Prof. Thomas Diamond, Dr. Louis Newkirk, Dr. Lawrence Ashley, Dr. Verne Fryklund, Earl Bedell, and Frank C. Moore. Mr. L. H. Dennis, of the American Vocational Association, has accepted a place on the program.

The eighth annual convention of the Southeastern Arts Association was held March 10–12, in Tampa, Fla. Dr. William T. Bawden, of Pittsburgh, Kans., was the speaker at the second general session on Friday morning, speaking on the topic, "The Educational Significance of the Vocation," and at the third general session on the topic, "Integration of the Fine and Industrial Arts with General Education." He also spoke at two sessions of the Industrial-Arts Section on Thursday evening, on the topic, "Some Problems of the Teacher of Shopwork and Drafting," and on Friday afternoon, on the topic "National and Regional Trends in Industrial Education."

At the 1936 convention of the American Vocational Association, held in San Antonio, Texas, an organization of national scope was formed by those engaged in preparing industrial teachers. The group adopted a constitution and formed a permanent organization in Baltimore, on December 1, 1937.

The name of the new organization is The National Association of Industrial Teacher-Trainers. The Association seeks to bring about closer cooperation among those engaged in preparing and upgrading teachers and other workers in industrial education. It seeks to stimulate and to take action concerning practices and proposals in industrial teacher-training and in other educational phases related thereto. It also seeks to foster research and the recording of experience in line with professional interests.

The president was authorized to appoint a research committee of three members.

The officers elected for the next year are:

President, George E. Myers, University of Michigan; vice-president, V. P. McKinley, University of Alabama; vice-president, Lynn E. Stockwell, University of California; secretary-treasurer, Homer J. Smith, University of Minnesota.

The Oklahoma Industrial-Arts Association held its annual meeting in Oklahoma City, on February 10 and 11, with over 300 persons in attendance.

Mr. E. P. Chandler, of Tulsa, gave a talk on "To What Extent Shall Textbooks Be Used in Industrial-Arts Classes"; Prof. M. E. Franklin, Tahlequah, discussed "What Unit Courses Should Be Accepted for High-School Credit by the State Department of Education?" Prof. M. L. Curtis, of the State Education Department, presented a bulletin on "Accident Prevention in School Shops." O. B. Badger, Tulsa, gave a paper on "Guiding Philosophy for Industrial Arts in Junior and Senior High Schools."

A report of the State Advisory Committee for Industrial Arts in Oklahoma Schools was read by DeWitt Hunt, of the Oklahoma A. and M. College, Stillwater.

Mr. H. F. Rusch, of Oklahoma City, was presented with a plaque, in honor of his long service in teaching industrial arts in Oklahoma. Mr. Rusch, who is one of the best known industrial-arts men in the state, has been supervisor of industrial arts in Oklahoma for more than twenty-five years.

A combined meeting for teachers and supervisors of agriculture, home economics, industrial arts, trade and industrial education, and rehabilitation was held, when Thomas H. Quigley, of the Georgia School of Technology, gave an address on "Economic Security."

The annual luncheon was held at noon, with over three hundred in attendance. Prof. O. B. Badger, of Tulsa, acted as toastmaster, and Walter Harrison, Oklahoma City, gave the address.

The following officers were elected for the next year:

President, Dr. Banks, Chickasha; vice-president, Conrad Schreiner, Ponca City; secretary-treasurer, H. F. Rusch, Oklahoma City. — *Hugh Norris.*

The Industrial Arts and Vocational Club at San Antonio, Texas, is trying out a new plan for its meetings. The club meets on Saturday morning for breakfast. The first meeting of the year was on October 29, in the Tapestry Room of the St. Anthony Hotel, when 75 persons were present. Mr. J. O. Loftin, president of the Texas College of Arts and Industries, was the principal speaker. The second meeting was held on December 4, with Dr. Peterson, of the University of Texas, as the speaker.

## New Publications

**General Shop Handbook**

By George A. Willoughby and Duane G. Chamberlain. Paper, 96 pages, 8½ by 11, illus-

(Continued on page 12A)

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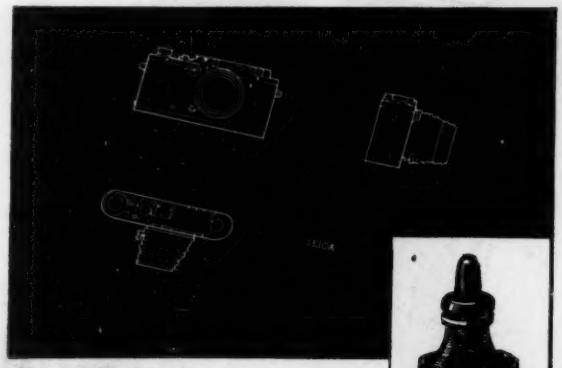


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McGRAW-HILL BOOK COMPANY, Inc.
330 West 42nd Street New York, N. Y.

(Continued from page 10A)

trated. Price, $1. Published by the Manual Arts Press, Peoria, Ill.

This handbook presents well-prepared operation and information units on drawing, woodworking, metalwork, finishing, plumbing, and pipe fitting, concrete work, electrical work, tool sharpening and reconditioning, and some units on window glazing, and door hanging. The book is well illustrated and presents a well-planned course for the general shop.

**General Shop — Gas and A.C. Arc Welding and Cutting**

By R. F. Jennings. Paper, 84 pages, 7¾ by 10¼, illustrated. Price, 72 cents. Published by McKnight and McKnight, Bloomington, Ill.

This book contains explicit, yet concise directions for welding by both gas and electrical welding methods. The book is illustrated so that all operations may be easily studied and followed. True and false statements are made part of each of the 63 units. A number of projects embodying welding are shown.

**Personal Development Manual**

By Dick Carlson and Sylvia D. Carlson. Paper, 69 pages, 8¼ by 10⅝, illustrated. Price, $1. Published by Harper & Brothers, New York City.

This manual is designed to be used with the text *How to Develop Personal Power*. It is a guide which is to help the student solve the problems which he encounters in choosing a vocation.

**Manual of Safety Education for Vocational and Industrial Arts**

Edited by Burton H. Rowley. Paper, 46 pages. Compiled and published by the Orange County Industrial-Arts Association, Santa Ana, Calif.

A set of safety rules, compiled by a group of men having experience in school shops and the use of shop equipment. The booklet has been designed as a textbook for teaching safety practices, and the subject matter has been condensed as much as possible. Among the topics treated are first aid in the shop, woodshop, printshop, machine shop, sheet-metal shop, and welding.

**Graphic Design**

By Leon Friend, M.A. and Joseph Hefter, Ph.D. Cloth, 8 by 11, 407 pages, illustrated. Price, $7.50. Published by McGraw-Hill Book Co., 330 West 42nd Street, New York City.

A comprehensive survey of the graphic arts covering lettering, printing, reproductive arts, photography, advertising art, and the poster. There also are chapters on art education and bookmaking. The historical background of the graphic arts is quite thoroughly covered. A glossary of terms and a comprehensive bibliography are appended. The book is copiously illustrated.

**Household Mechanics — Industrial Arts for the General Shop**

By Earl L. Bedell and Ernest G. Gardner. Paper, 130 pages, 8½ by 11, illustrated. Price, $1.25. Published by the International Textbook Company, Scranton, Pa.

A general-shop course based on household mechanics, written in the language of the junior-high-school student. The book covers the following types of activities: Plumbing; care of doors and windows; electrical appliances; metalwork; woodworking; wood finishing; care of tools; rope and twine; concrete, mortar, and plaster. About 100 practical jobs are included in the course. All of the jobs are illustrated and broken down into step-by-step procedure directions. Questions and appraisal guides also are added.

**Farm Shop Laboratory Manual — Book I**

By M. F. Thurmond. Paper, 118 pages, 8½ by 11, illustrated.

This revised edition contains instructional material, factual data, tests, and outlined jobs in eight areas of manipulative activities commonly found in agricultural communities. The areas covered are: Woodwork, rope making, harness repairing, sheet-metal work, plumbing, blacksmithing, concrete and electricity. The manual is well illustrated and the material in it is so arranged that after the student has recorded his calculations and observations in the spaces provided for them, the book will be a valuable keepsake for the future.

**Basic Operations in Printing**

By W. A. Fitzgerald. Paper, 136 pages, 8¼ by 10¼, illustrated. Price, $2.50. Published by The Peabody Press, Nashville, Tenn.

A mimeographed set of operation sheets for use with classes in beginning printing. The subject matter is presented in 35 well-illustrated operation sheets. Each one of these contains a number of suggestive questions and a set of references to textbooks containing related instructional material. The bibliography at the end of the book covers 13 pages.

## News Notes

¶ The National Graphic Arts Education Guild has plans under way for a research project in 1938. The plans call for a fourfold investigation into printing education as it is conducted in the junior high, senior high, vocational school, and college. No comprehensive survey of the subject has been made in recent years and it is believed that such a survey will be an outstanding contribution for a research project.

(Continued on page 15A)

ADVERTISING PAGES REMOVED

A NATIONAL CENTER FOR

**SUMMER COURSES FOR TEACHERS**

*of Industrial Arts*

During recent summers, teachers from twenty-five states have enrolled in the industrial education courses offered at the Carnegie Institute of Technology. In response to this wide acceptance of Carnegie as a national center for summer courses, an extensive program of instruction has been arranged for the 1938 Summer Session.

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The summer session at The Stout Institute is planned particularly for teachers and others interested in Industrial Education and Home Economics. In addition to work in these fields, an excellent range of courses is also offered in science, social science, English, education, and vocational education.

Short units are offered by national leaders in Administration of Vocational and Adult Education, Supervision of Vocational and Adult Education, Family Life, Conference Leadership, Safety Education, Apprentice Training, Consumer Education, Problems in Curriculum Construction, and Distributive Occupations.

Menomonie, located in Northwestern Wisconsin, is within short driving distance of the famous Wisconsin summer resort country. Residence facilities include expanded and remodeled dormitory accommodations, college camp colony, and numerous lake cottages. Excellent opportunities for combining professional study and recreational activities.

The Stout Institute summer session offers graduate curricula leading to the Master of Science Degree in Industrial Education or Home Economics, and undergraduate curricula leading to the Bachelor of Science Degree in these fields.

*Write for the Summer Session Bulletin.*

**DIRECTOR OF SUMMER SESSION**
**The Stout Institute** **Menomonie, Wisconsin**

(Continued from page 12A)

¶ Rubber synthesis on a mass production scale has been accomplished by three of the world powers. Dr. Edward W. Starkweather, a research chemist for the E. I. duPont de Nemours Company, Wilmington, Del., in a recent lecture-demonstration at the Bay Ridge High School, Brooklyn, N. Y., traced the history of attempts at synthesizing rubber, going as far back as 1875. Dr. Starkweather described the recent successful efforts in the United States, Germany, and Russia and said that the potential supply is unlimited. The speaker predicted, however, that for many years to come, the rubber tree will still remain the chief source of supply.

¶ The William Hood Dunwoody Industrial Institute, in Minneapolis, Minn., is offering new courses in acetylene welding, advanced plumbing, advanced milling and baking chemistry, locomotive valve setting, oil burner and conditioning control, switchboard wiring, and advanced show-card writing.

¶ The New York City school authorities are completing plans for an ambitious program of development in vocational education. Within the next few years it is planned to spend $52,000,000 for specialized vocational schools. Already, schools for printing and textiles have been completed. Fourteen such special schools are to be erected. The new program has been proposed as a result of a survey which revealed that less than 6 per cent of the boys and girls of the city go on to college.

¶ The Hadley Trade School, St. Louis, Mo., is offering a trade course in commercial photography. Mr. Princell is the instructor. About a dozen boys have been enrolled, who go out on photographic assignments.

¶ A model 30, 6-mold linotype and an all-purpose linotype has been installed in the composing room of the department of publishing and printing of the Rochester Athenaeum, at Rochester, N. Y. A giant caster monotype is also part of the equipment, with mats for 42- to 72-point sizes.

¶ The second lecture in a series on printing was given by the new Department of Printing and publishing of the Rochester Athenaeum, Rochester, N. Y., by Mr. Frank Smith. More than one hundred persons were present to hear Mr. Smith talk on the progress made in the printing industry since the advent of the first mechanical printing machines in press and composing rooms.

¶ The school board at Braintree, Mass., has approved plans for enlarging the present vocational-guidance plan in the high school.

## New Products

¶ With the growing use of floor seals that must be steel-wooled between coats or before application of wax or other finishing material is applied, the demand for equipment to do the job quickly, easily, and economically, has challenged the ingenuity of floor machine manufacturers.

The Porter-Cable Machine Company, Syracuse, N. Y., has issued a new Type S-W combination steel-wooling and polishing machine, which is a very efficient machine. The S-W Combination steel-wooling machine is the only machine of its kind which permits the slipping on or off of cardboard cylinders of steel wool in less than one minute. It steel wools and polishes with the grain, eliminating all possibility of circular scratches; it requires no disassembly to replace the steel-wool cylinder; and its dust-collecting system is efficient. A tilting device permits pressure control for either steel wooling or polishing.

Complete information will be sent to any shop instructor upon request.

¶ In recent years, stainless steel has been utilized for all manner of cooking and processing equipment. From packing and canning plants to hotels, restaurants, and railroad dining cars, stainless steel is replacing less sanitary material for equipment of all kinds.

The Ludlum Steel Company, Watervliet, N. Y., has been a leader in this development. Its own brand of stainless steel, Silcrome, is well known. The firm has recently added to its line, a stainless-steel product known as Ludlite, a composite product, whose outer surface is strong, thin, stainless steel. Its backing is a tough, flexible, non-metallic material. Through a special manufacturing process, the Silcrome steel and the flexible backing are bonded through heat and pressure. This backing material affords support to the steel and makes it possible to cement the Ludlite to plaster, wood, fiber board, concrete, and other surfaces.

Ludlite is flexible, easy to apply, and is an effectual sound-deadener. It is a money saver due to the saving in installation cost. Any artisan, home craftsman, or carpenter can use the material with the aid of directions supplied by the manufacturer. Complete information will be sent to any shop instructor upon request.

¶ The Allied Radio Corporation, Chicago, Ill., has attained a leading position in the field of radio and has been a leader in pioneering radio development, so that today it is serving hundreds of leading schools with every type of radio equipment.

(Continued on page 19A)

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# Answers to Questions

## FINISHING MAPLE

Q.: What is a good method of finishing maple to secure the reddish brown color which is so popular at the present time? — *J. B. M.*

A.: The new shades of brown maple are made by using standard walnut 4-oz. solutions; standard red and standard black the same. For instance, use 2 oz. of the walnut, ¼ oz. red, and a trace of the black solution. Put in a measure, reduce with an equal volume of water and apply to the sample panel. Reduce equally again and again. Apply to another test panel. Repeat for at least four panels. Let dry, give a coat of very weak orange and white shellac equal parts, let dry; varnish, dry and rub dull. Then you will have a basis of judging your color proportions. Without some such rational method as this only chance or long experience will enable you to "hit" a color the first time. Finally, a lot of this year's furniture is being shade-coated evenly with the walnut-shade coat as mentioned in my book, *Principles of Mill and Paint-Shop Practice.* — *Ralph G. Waring.*

## PRODUCING A BONE FINISH

1023. Q.: Do you have any data on how to produce the so-called "bone" finish? This finish consists of a white enamel or lacquer with some top coat rubbed on in spots to resemble a bone finish. — *C. J. R.*

A.: 1. Spray one coat of white wood undercoater and dry two hours.

2. Sand with No. 6/0 paper.

3. Spray one coat flat white lacquer; dry two hours.

4. Sand with No. 6/0 paper.

5. Brush gold bronze on edges.

6. Brush and wipe antiquing stain; dry two hours.

7. Spray one coat of water white flat or eggshell finish lacquer.

This is the standard Sherwin-Williams Old Bone White Finish Schedule, of Cleveland, Ohio. If the amount of business you can offer will warrant it, the company will be glad to send a full sample panel as accepted by the trade. — *Ralph G. Waring.*

## FINISHING WHITE OAK FLOORS

1025. Q.: What would you consider the best finish for new white oak floors for living, bed, and dining rooms for a typical home? — *H. H. R.*

A.: This is a rather broad question. However, a few of the factors that enter in will be discussed.

First, there is the fundamental factor of color values to be decided. Two schools of thought exist — the one trained in technical color values, insists that the floor color shall be the darkest, the side walls somewhat lighter, with the ceiling the lightest of all. The second insists that the floor be finished as light as possible, in order that the wood may show up in all its natural beauty, especially if it is that grade known as "Sap clears," selected for color and figure in quartered white oak. While I have finished many thousands of square feet of the light floors to produce some really fine results, I still feel that the dark floor finishes are much to be preferred if they are to harmonize with our modern shades of walnut and mahogany furniture. Such a floor affords a much more substantial background for such furnishings, and in the long run is sure to prove the most satisfying.

Second, the decorating trade is likewise about equally divided between the use of shellac or varnish as the protective coating. If the man of the house is a clever "home mechanic" who can take care of work spots which occur in and around doors, on shellacked floors, then he is justified in using that material, remembering that it has no resistance whatsoever to water, and hence must be kept waxed frequently. The odium of the latter operation is somewhat lightened in these days by the use of the so-called "rubless" waxes which shine of themselves without the need of a polishing machine.

The use of the newer types of 4-hour varnishes will produce a better finish under average conditions, and a waxed effect can be had through the use of the new type of wax on the last coat after the varnish coat has been allowed a week to dry. The gloss should then be cut off with fine steel wool, after which the floor is to be wiped, cleaned and then waxed. — *Ralph G. Waring.*

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(Continued from page 14A)

The latest product of the Corporation is a handy-size chart which shows the specific uses of radio and sound equipment in schools. It was prepared for the use of school administrators, supervisors, and architects, and shows how radio-sound equipment can be utilized most effectively in enlivening and enriching both curricular and extracurricular activities. Uses of sound systems, radio receivers, phonograph equipment, recording units, and intercommunicating systems are diagramed for school activities. The chart will be sent free on request to the Allied Radio Corporation, 833 W. Jackson Blvd., Chicago, Ill.

¶ Floor machine users will be interested in a new gasoline, motor-driven floor machine which is satisfactory for use where electricity is not available.

The Porter-Cable Machine Company, Syracuse, N. Y., has just added to its line of speedmatic floor sanders, a gasoline-powered drum floor sander. This sander, with the exception of motive power, is similar in every respect to the Speedmatic Contractor Special.

The new machine contains a 1½-h.p., air-cooled engine, mounted in the chassis on one hinge pin, easily removed for portability; a sanding drum 8 in. wide and 7½ in. in diameter, rubber mounted to assure smooth cutting; and an interchangeable feature making it possible for the electric motor and the engine to be interchanged when necessary. The machine has been subjected to rigid tests and is guarantced to give longer life to the abrasive paper used.

Complete information will be sent to any shop instructor upon request.

# New Trade Catalogs

¶ The Kuempel Chime Clock Company, Guttenberg, Iowa, has issued a booklet entitled, "How Clocks Are Built," which contains complete assembly dimensions of eight popular clock movements. The Kuempel service of furnishing drawings and directions for making clocks, or the drawings plus moldings and ornaments, or the drawings and the entire kit of everything necessary for making a given clock, is also described. Complete information will be furnished to any shop instructor upon request.

¶ The Albert Constantine & Son Company, 797 East 135th St., New York City, has just issued its latest 1938 catalog, addressed to school and amateur craftsmen. In it are described a full line of fine cabinet woods, and how and where they may be used in a variety of projects. The catalog includes some 940 individual items, 140 illustrations, and a wealth of valuable information on the use and finish of fine cabinet woods.

A free copy of the catalog will be sent to any shop instructor upon request. Shop students can obtain a copy of this useful and valuable booklet upon payment of fifteen cents.

¶ The American Crayon Company, Sandusky, Ohio, has issued a new illustrated folder entitled, "How to Do Linoleum Block Printing," which offers interesting information on various techniques which are possible with linoleum blocks. Examples are given of designs which can be executed in different techniques with fused gray linoleum blocks.

The fused gray surface on linoleum blocks is a recent development, which eliminates light reflection, makes cutting easier, and minimizes eye-strain.

A copy of the folder is available by writing to the American Crayon Company at Sandusky, Ohio.


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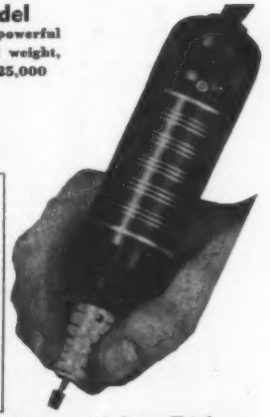

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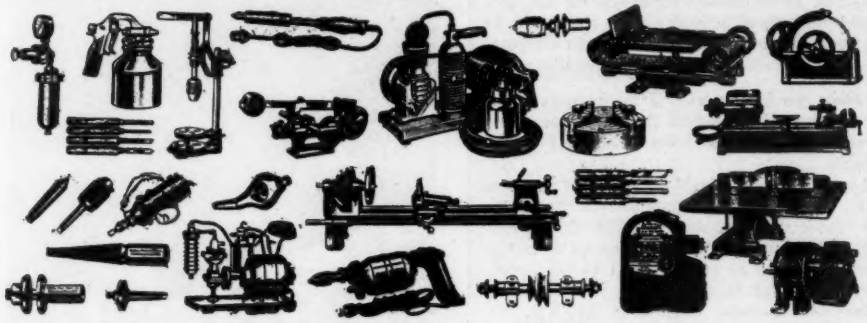

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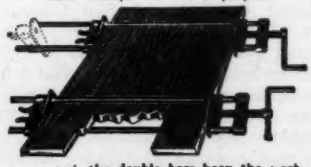

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